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# JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION



VOL. 36, NO. 7

JULY 1944



Use Less . . So Our Fighting  
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**AMERICAN WATER WORKS ASSOCIATION**  
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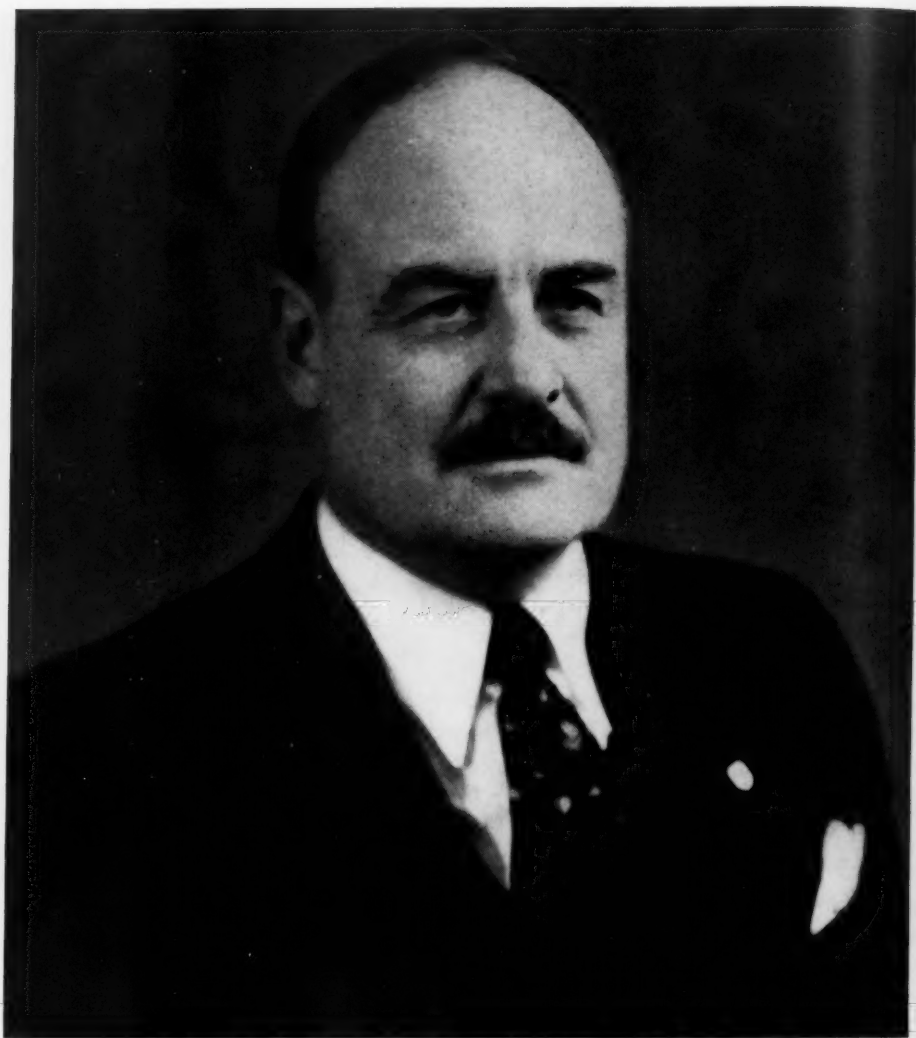


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# **JOURNAL**

## **OF THE**

# **AMERICAN WATER WORKS ASSOCIATION**

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Vol. 36

July 1944

No. 7

## **The London Water Supply**

*By Henry Berry*

**W**HAT is the problem confronting those who are responsible for London's water supply? It is that of supplying a population which in pre-war days amounted to approximately  $7\frac{1}{4}$  million, with an average supply of 300 mil.gal. For a better understanding of the figures involved, it should be noted that the population in the Board's area of 540 sq.mi. is greater than that of the whole of the continent of Australia, greater than the population of Sweden, nearly twice the population of Denmark and approximately one and one-half times the population of the whole of Scotland. Other things may fail, but the water supply to these millions living and working at the very heart of the British Empire must not be allowed to fail.

The water supply comes from three main sources: (1) the Thames, (2) the Lee, and (3) wells in the Lee Valley, the southern district and Metropolitan Kent. The proportions are approximately two-thirds from the Thames, one-sixth from the Lee and

one-sixth from wells. The water obtained from these sources has a common factor in that every drop of it must be pumped to its destination, whether that destination be the low-lying lands of Southwark and Bermondsey, the heights of Hampstead and Highgate to the north or the Crystal Palace and Shooter's Hill to the south. Even where the lands are low and adjacent to the Thames itself, pumping is still the order of the day, for all the Board's intakes are well up above the tideway and, therefore, miles distant from these low-lying lands.

The London referred to here is "Water London," constituted as one entity for the purpose of water supply by the Metropolis Water Act of 1902, and slightly modified by subsequent acts. It extends north to south a distance of  $42\frac{1}{2}$  mi. from Ware in Hertfordshire to Winkhurst Green in Kent, and east to west a distance of  $34\frac{1}{2}$  mi. from Southfleet in Kent to Sunbury in Middlesex.

### **The Coming of the Companies**

Complaints regarding the adequacy and purity of the supply first appeared during the Plantagenet period. In

A contribution by Henry Berry, Chairman, Metropolitan Water Board, London, England.

1236, Henry III complied with the request of Gilbert de Sanford for facilities to be granted to enable water to be brought into London from Tybourne. (The modern location of this place is near Stratford Place, Oxford Street.) Lead pipes were used for the purpose.

About 1255-58, the White Conduit was set up (near what is now Chapel Street, Lambs Conduit Street, Bloomsbury) for the purpose of supplying the Grey Friars Monastery with water. In 1285, the Great Conduit was established in West Chepe, this being the first example of a cistern or reservoir of lead, castellated with stone, to be established in the city. About 1306, the Devil's Conduit was established to augment the supply from the White Conduit. The distance between the two was about  $\frac{1}{4}$  mi., Devil's Conduit being located in what is now Queen's Square, Bloomsbury.

### Pollution Problems

In 1307, Hugh, Earl of Lincoln, complained in Parliament that the Old Bourne had become polluted on account of the filth poured into it from tanneries on the banks of that stream. River pollution by industrial effluents appears to be by no means a modern invention, but to have a long and dishonorable history.

Records of the Corporation of the city show that in 1329 money was paid for cleaning and repairing the Great Conduit in West Chepe and also for cleansing Tybourne Springs. Part of this money apparently went to provide beer for those engaged in the work.

The practice of obtaining water in an unauthorized fashion apparently is not a new one, for in 1337 measures were taken by the Corporation to prevent brewers from taking tubs of water for ale-making without payment.

This action was taken by the city as the brewers were openly defying an order of 1312 which enacted that brewers, cooks and fishmongers were to pay for water used for business purposes.

Further records indicate that in medieval times, by curious ways, they "made the punishment fit the crime." William Campian, of Fleet Street, was found guilty on November 12, 1478, of illegally abstracting water by tapping a conduit where it passed his house and turning the water into his own well. The record adds "thereby occasioning a lack of water to the inhabitants." As a punishment he was placed on horseback with a conical shaped vessel on his head. Water from this vessel ran down small pipes and drenched him as he was driven round to all the city conduits. As it ran away the water was constantly replenished and his crime was made public by proclamation at each conduit. He returned home well soaked, doubtless sick and sorry for himself and, it is hoped, a better and more public-minded citizen.

### Parliament Enacts Water Supply Law

In 1390 application was made by some of the citizens of West Chepe for permission to erect a conduit adjacent to the Church of St. Michael-le-Quern. It was proposed to supply this conduit by means of pipes from the conduit opposite the Church of St. Thomas Acon. Tybourne Springs eventually proved to be insufficient to supply enough water, and in 1438 the Corporation arranged with the Abbot of Westminster for water to be brought from his manor. The acknowledgment paid to the Abbot took the form of two peppercorns yearly.

The first act of Parliament in relation to London water supply was passed

city as in 1543-44 (The London Conduit Act). By this act the Lord Mayor and Corporation were empowered to bring spring water from Hampstead and the neighborhood to the city. A conduit of Thames water was established at Dowgate in 1568.

The Thames remained a salmon river and fairly pure until quite a late period. (It is on record that London apprentices petitioned against being given salmon as an article of diet on more than two days per week.) The minor streams, however, became fouled, and as the conduit supply became insufficient, it was necessary to turn to other supplies.

The first real attempt to supply London with water by mechanical means is credited to Peter Morice, whose name is variously spelled and whose nationality was either Dutch or German. From his capability as a water engineer it seems likely that Holland was his native land. In 1581 he undertook to give the city a supply of Thames water pumped from the river. His pumping mechanism was actuated by two large water wheels, driven by the force of the tide and attached to the first arch of London Bridge on the northern side. History does not state how Morice became a freeman of the city, but having the freedom was of service to him in getting his concession.

The water was to be supplied in leaden pipes to houses in Grass Street, New Fish Hill, Thames Street, and as far as Leadenhall. The pressure, for those days, was quite good and, at the first attempt, Morice was able to throw his water over the steeple of St. Magnus Church. Work was completed on Christmas Eve of 1582, but the supply did not long satisfy those whom it served.

For a very minute account of the

once greatly admired London Bridge Water Works the public are indebted to Mr. Beighton, an engineer. His report appeared in the Philosophical Transactions for the year 1731; but whether, at that time, all the works were precisely the same in form and action as those first constructed, or whether any improvement had occasionally been introduced, is not stated. The following summary contains the purport of Mr. Beighton's description; and it may be right to premise that the water wheels and machinery, being fixed in strong frames of oak, gradually rose and fell with the tides.

When Mr. Beighton wrote his description of the machinery at London Bridge there were three water wheels of the respective diameters of 19 and 20 ft. with axles of 3 ft. in diameter and 26 float boards, 14 ft. long by 18 in. wide. The pumps employed had cylinders, 4 ft. 9 in. long, and an interior diameter of 7 in. above and 9 in. below the valve. The cylinders of the pumps were fixed to the top of an inclosed square iron cistern, which had appropriate apertures with valves, just below the places where they were attached. To one end of this cistern was also affixed a pipe with a grating at the end to prevent weeds or other refuse from entering. It extended into the bed of the river for the purpose of supplying water to the pumps—these being worked by cranks, which the revolving of the water wheels kept in constant motion whenever the tides were flowing either up or down the river. One wheel operated 16 pumps, and their cranks were arranged so that 4 of them worked alternately, each set drawing its supply of water from the cistern in succession. Thus, a comparatively small quantity of water was conveyed into another inclosed square cistern,

placed above the valves and nearly parallel with the tops of the cylinders, and likewise connected with the pumps by bent pipes and flanges. Therefore, whenever the pistons of the pumps ascended, the water was forced along the bent pipes into the upper cistern from which a large pipe conducted it to supply the houses. The latter pipe had a horizontal direction for some length, and then another was fixed to it, having a slight ascent, so as to form a very small angle. These were fitted with valves to prevent the return of the water. One turn of all the wheels occasioned the whole of the pumps to make 114 strokes, and when the tide flowed quickly it produced 5 rpm. Thus the total number of strokes in that short time amounted to 684, which raised 1,954 hogsheads of water in 1 hr. Mr. Beighton suggested some improvements and stated that such was the power of the machinery that it would enable an ordinary man to raise 50 tons weight.

#### **Morice 500-Yr. Lease**

There is a vital connection between Peter Morice and "Water London" of today. The first arch of London Bridge was leased for a period of 500 yr. from 1581, and the second arch for a similar period from 1583. Leases were subsequently granted for three additional arches. Today London still has the doubtful pleasure of paying for the work of Morice and his successors, the payment taking the form of London Bridge Water Works annuities. The accounts of the Metropolitan Water Board reveal that a more or less grateful London still pays these annuities to the tune of £3,750 and will do so until the year 2082. It matters little that Morice's water wheels and their successors have long since disappeared,

or that the bridge to which they were attached has also gone—London still has to pay.

As an engineer, I am glad that for once an engineer made a good bargain. Generally speaking, engineers do the work of the world while other people reap the financial kudos. As a public representative I denounce the bargain on all scores.

#### **The Plymouth Enterprise**

In the early days of the reign of James I the City Corporation promoted a bill in Parliament to enable a new and purer supply of drinking water to be brought to the city. This bill received the Royal Assent in 1606 and a subsequent act was passed in 1607. It is a matter of conjecture as to how far the Corporation was influenced in this matter by the example of Plymouth, whose citizens had a supply brought from Sheeps Tor on Dartmoor. The author of the Plymouth enterprise was Sir Francis Drake, and, presumably, this act of civic piety on his part can be regarded as an offset to his many acts of piracy. The distance from Sheeps Tor to Plymouth is only 7 mi. as the crow flies, but owing to the nature of the ground, the channel—known as the Leet—was a winding one, 24 mi. long.

History has a knack of repeating itself in respect to municipal enterprises as well as in other directions. The London County Council had the right to take over the London Electricity Supply Companies in 1931, but voluntarily allowed them another 40 yr. of life until 1971, thereby leaving the larger part of London to the tender mercies of these companies. The Corporation acted in a similar manner in the reign of James I, and thereby lost a wonderful opportunity of initiating a



Jacobean municipal water supply. The rights of the Corporation were passed to Hugh Myddleton, a Welsh goldsmith in business in London.

The scheme which Myddleton took over from the City Corporation was to bring drinking water from springs at Chadwell and Amwell, in Hertfordshire, to the city. The act under which the necessary authority was granted gave powers for taking land required, the owners receiving compensation, which compensation was to be to the satisfaction of commissioners appointed for the purpose.

As is usual when anything is projected for the public weal, there seems to have been a good deal of agitation against the New River, as it afterwards came to be called. In 1610, a bill was presented to Parliament to repeal the act authorizing the New River, but Parliament was prorogued by James I and, as it did not meet again until 1614, the work went merrily on.

Dutch water engineers were employed to carry out the scheme as they were then the most successful water engineers in Europe, centuries of warfare to retain their own land against the onslaughts of the ocean having given them the pre-eminence.

To use a modern phrase, Myddleton apparently had "bitten off more than he could chew," and by the time the excavations reached Enfield he found his resources badly strained. In his need he turned to King James I for a grant to enable the work to be finished.

James I made a good bargain, for while Myddleton was to have the worry of running the undertaking the King was to receive one-half the profits. Still, beggars cannot be choosers, and Myddleton was glad to have the assistance. The royal favor had another

aspect and that was to kill another scheme for supplying London with water from the Lee at Hackney. This stream was a very different one from that to be seen at Hackney today, but the projected enterprise could only have been a temporary one. As it was, it was stillborn.

The terminus of the New River was the Round Pond at Clerkenwell on the site of which the present Water Board building is erected. On Michaelmas Day, 1613, the official opening ceremony was performed, this event afterwards being called "Myddleton's Glory." The lord mayor, sheriffs, aldermen and councillors and a very large company were present, including Sir Thomas Myddleton, who had been elected Lord Mayor for the ensuing year. The water flowed into the pond, and wine flowed to its usual destination, accompanied by the floods of oratory—real or alleged—that to this day still mark occasions of greater or less importance.

Jacobean Londoners had a characteristic which has marked some of their present-day successors—a rooted objection to paying for their water—and this led to Myddleton's venture not becoming an immediate financial success.

In 1619, the New River Co. was incorporated by royal charter and the founder was appointed the first governor.

Originally the New River was about 40 mi. long but several loops have been short-circuited since. Its width varied from 10 to 25 ft. and the depth at the center from 4 to 6 ft. The fall averaged 3 in. per mi.

As business increased it was found that the supply afforded by the New River was insufficient and recourse was made to the River Lee, this being legal-

ized by act of Parliament in 1738. A condition of the abstraction was that an annual payment should be made to be devoted to a fund for the improvement of Lee navigation. This payment continues to this day. The original intake from the Lee was near Hertford, but in later years water was also taken at Tottenham.

The New River Co. took over by purchase London Bridge Water Works, Hampstead Water Works, York Buildings Water Works and the North Middlesex Water Works. Its area of supply was bounded on the east by the district of the Tottenham Board and the East London Water Works; its western boundary was the area supplied by the Chelsea, Grand Junction and West Middlesex Water Companies while its southern boundary was the Thames. Included in its area of supply were the city, central London and the northern suburbs.

### Additional Supply

In 1544 the City Corporation obtained an act of Parliament to enable water to be brought to London from Hampstead heath, Marylebone, Hackney, Muswell Hill and various other places "within fyve miles of the saide Citie." Masterly inactivity prevailed until the year 1589, but in that year the Hampstead reservoirs were formed on the line of the Hole Bourne in the valley between White Stone Pond and where the Hampstead Heath Station of the North London Railway now is.

In 1692 a company was formed and obtained these reservoirs from the City Corporation who apparently wanted to divest themselves of the responsibility. Highgate Ponds were formed by the company who, in 1777, made the pond in the Vale of Heath, at Hampstead. These ponds were fed by the Ken or

the Hole Bourne. The company was bought by the New River Co. in 1855.

Like his grandfather, Charles II was very fond of granting patents or monopolies—generally to his immediate circle of friends—and one of these patents was granted to a group for supplying water to the west end of London. The undertaking was designated at first as "York Water Works," but afterwards came to be called "York Buildings Water Works." In 1691 an act of Parliament was obtained which incorporated the group under the title of "The Governor and Company of Undertakers for Raising Thames Water in York Buildings." The "York" part of the title was taken from York House, and the water works were situated at York Gate, at the bottom of Villiers Street, under which the chief reservoir was situated.

### The Cinderella of London

For a time the company did rather well by buying the forfeited estates of Jacobites, but failure to live up to their water obligations—the prime business after all, of a water undertaking—caused them to lose their customers to the New River Co., the Chelsea Co. and Grand Junction Co. While in existence the area supplied was Whitehall, Covent Garden and Piccadilly.

The company's mains were leased to the New River Co. and the undertaking came completely under that company in 1818. There is a perpetual reminder of the York Buildings Water Works in the fact that "York Buildings Perpetual Rent Charge" of £25 still appears in the annual accounts of the Metropolitan Water Board.

Until the Board had reorganized distribution it seemed to have been the fate of East London to be the Cinderella of London from the point of view

of water supply. The earliest organized supplies were given by the New River Co., the Shadwell Co., and the West Ham Co. It must be confessed, however, that these proved to be hopelessly inadequate, and many of those supposed to be so served were compelled to get what water they could, as they could.

The Shadwell Co. had its origin in the Shadwell works laid down by Thomas Neale on land leased from the Dean of St. Paul's. A pump worked by four horses (literally, 4 hp.) was used in the first instance, and in 1679 another of these was added to cope with the growing demand. A charter was granted to Neale in 1687, and a company was formed which, in 1691, became incorporated under letters patent. Horse engines were used until 1750, when a steam engine was installed which proved inadequate, and in 1774 was augmented by a Boulton & Watt engine having a pumping capacity of 1.3 mgd. This engine enabled the company's business to expand, the area served being bounded west to east by the Tower of London and Limehouse Bridge, and north to south by Whitechapel and the Thames.

The year of the second Jacobite rebellion (1745) saw the formation of the West Ham Water Co. to supply water to Stepney, Bethnal Green, Bow, Stratford, Bromley and part of Whitechapel. Water was pumped by means of a water wheel and a steam engine, and a reservoir was constructed at Mile End for storage purposes.

This water undertaking and that of the Shadwell Co. were purchased by the London Dock Co. in 1807, and later passed into the hands of the East London Water Works Co., which was founded in 1807 for the purpose, and

which also aimed at supplying the whole of the East End of London.

Old Ford, just over 3 mi. from the Thames, was chosen as a pumping station site, and two reservoirs were constructed 10 ft. deep with their bottoms level with the bed of the River Lee. Two others were made on the opposite bank of the Lee with bottoms 5 ft. 6 in. lower, the four being connected by an underground aqueduct. In 1815 lines of demarcation of areas of supply were arranged with the New River Co. with reservation of the right of each company to supply in the area of the other in case of failure or refusal to supply. The year 1820 saw the purchase of Hackney Water Works and Lee Bridge Mills, and in the same year an act of Parliament was obtained for the removal of the intake from Old Ford to Lee Bridge Mills and the construction of an aqueduct from intake to the Old Ford reservoirs.

### Filter Beds Installed

The daily amount supplied in 1828 was 5.9 mil.gal., while the engines had a daily pumping capacity of 8 mil.gal. A new pumping engine was laid down in this year which added 3 mil.gal. to the capacity. Expanding business and the need for prevention of sewage pollution resulted in other applications to Parliament, which were crowned with success in 1852. Under the provisions of the 1852 Act an intercepting drain was constructed from Tottenham to just below Ponders End for the purpose of preventing sewage reaching the Lee near the intake. Reservoirs at Walthamstow and filter beds at Lee Bridge were also constructed. Additions to these reservoirs and filter beds were authorized under one of the Acts of 1867.

This year saw a new departure on

the part of the company for Parliamentary powers were obtained whereby the construction of works at Sunbury was authorized. This meant the reinforcement of the Lee supply with Thames water to the tune of 1 mgd., except in time of flood. The construction of a reservoir at Hornsey (Finsbury Park) was authorized.

### Sewage Works

The Acts of 1867 are examples of being wise after the event, as they were consequent to the great cholera epidemic of 1866. The company was compelled to discontinue the use of Old Ford reservoirs and to fill them up; at the same time the aqueduct from Lee Bridge to Old Ford was put out of action permanently. Sir John Simon, reporting on the epidemic said: "The area affected was almost exactly the area of this particular water supply, and nearly, if not absolutely filling it, and scarcely, if at all, passing beyond it." The Old Ford works were finally closed down in 1892.

In 1886 the company obtained further powers to extend the sewage interception works to prevent sewage reaching the Lee above their intakes. They were also authorized to sink wells at various places in their area. Under these powers a well was sunk and a station built at Waltham Abbey, but other wells and stations were built at Rammey Marsh, Ponders End, Barkington and Ferry Lane.

Further reservoirs were constructed at Tottenham, Edmonton, Walthamstow and Chingford under the Act of 1897, the total additional capacity being 1,200 mil. gal.

At the end of its career the area supplied by the East London Co. included Waltham Abbey, Waltham Holy Cross, Chingford, Walthamstow, Loughton,

East Ham, West Ham, North Woodwich, Limehouse, Old Ford, Stepney, Stratford, Whitechapel, Aldgate—in fact, East London generally.

### Water from the Ravensbourne

In 1701, letters patent were granted conferring the sole right for 500 yr. to take water from the Ravensbourne to supply the inhabitants of Sayes Court and East Greenwich. Under these rights water works were established at Ravensbourne. When the Kent Water Works Co. was established it came into conflict with those rights and, in 1809, the company was prohibited by an act of Parliament from supplying water in such a way as to affect the rights of the patentees without their previous consent, or until their water works were bought. The Kent Co. took the easy way out of the difficulty and took over all the rights and privileges of the patentees by purchase. In 1809 the authorized limits of supply were Deptford, Greenwich, Lee, Lewisham and Rotherhithe.

The town commissioners of Woolwich obtained powers in 1808 to supply that district with water, but in 1811 the transfer of these powers to the Kent Co. was confirmed by act of Parliament. Arrangements were also made whereby the various government factories and barracks, as well as the Royal Dockyard, were to be supplied. To these were added the Royal Victualing Yard at Deptford and the Royal Observatory and Royal Hospital at Greenwich.

### Purchase by Kent Co.

Competition arose in 1853 in the shape of the Plumstead, Woodwich and Charlton Consumers Pure Water Co., but, although this company sank a well and installed plant, bankruptcy

overtook it, and the plant was purchased by the Kent Co.

The formation of the North Kent Co. occurred in 1861. The area of this company was to include Erith, Eltham, Crayford, Dartford, Bexley, Wickham, Bromley and Chislehurst, but the threatened invasion of the area—potential or actual—of the Kent Co. was averted by the purchase of the undertaking by the Kent Co. in 1863.

The area of the Kent Co. was still further increased in 1868 by the purchase of the water works of the Dartford Local Board of Health. In 1877, following a request from the Bromley Rural Sanitary Authority and the Dartford Rural Sanitary Authority, the Kent Water Works Act was passed, and the area of the company was extended to 120 sq.mi. Among the added districts were Swanscombe, Farningham, Eynsford, the Crays, Orpington, Farnborough, West Wickham, Hayes and Keston.

By arrangement with the Bromley and Sevenoaks Sanitary Authorities an Act of Parliament was obtained in 1888 which extended the area eastwards to Southfleet and southwards to Westerham and Cudham. This gave the company an area of 178 sq.mi., of which approximately 30 sq.mi. were found to be in the administrative County of London when that county was defined in 1888.

### Supply Unfiltered

As has already been mentioned, the original works were situated on the banks of the Ravensbourne, water being distributed through wooden pipes. The first engines were by Smeaton, but later Boulton & Watt engines were installed, and it is only within the last few years that the last-named engines have ceased to be used.

Until 1844 unfiltered Ravensbourne water was supplied, but in that year the first filter bed was constructed by the company. In 1850 additional filter beds and a subsidence reservoir were constructed.

### Royal Charter

*Chelsea*—Commissioners and trustees were appointed under the provisions of an act of Parliament in 1722 for the purpose of securing a good supply of water to Westminster and its environs. Among their duties was the construction of conduits from the Thames, from which water could be lifted into reservoirs in the neighborhood of Hyde Park. Forming themselves into a corporation with the title of "The Governor and Company of Chelsea Water Works," they obtained a royal charter in 1723. This enabled them to obtain the capital necessary for their work. By 1726 conduits from the Thames supplied reservoirs in St. James Park, and water was supplied to a 1,350,000-gal. reservoir in Hyde Park.

Although the very hard winter of 1739-40 nearly put the company out of business—a few weeks' frost deprived its customers of their normal supply—it would appear that by 1767 the daily supply was 784,000 gal., rising to 1,456,000 gal. in 1809.

A few years later, subsiding reservoirs were introduced which assisted in the work of purification, and this work was aided still further by the introduction of the filter bed by the company's engineer, James Simpson. He had given quite a number of years to the study of this subject and the outcome—the modern slow sand filter—was of a revolutionary nature.

By the Chelsea Water Works Act of 1852 the company was empowered



to construct its station at Seething Wells, Kingston-on-Thames. Intake, filter beds, pumping plant and all the other works were completed by 1856 and water was pumped to reservoirs at Putney Heath for distribution by gravitation.

The intake at Seething Wells did not prove to be too satisfactory, and another act was obtained in 1875 which enabled the West Molesey station to be erected.

The supply area of the Chelsea Co. included Buckingham Palace, Westminster, Kensington, Chelsea and Fulham, although parts of these areas were also supplied by other companies.

*Southwark and Vauxhall*—The district south of London Bridge was, for centuries, regarded as a "poor relation" by the city of London and treated accordingly. Hence, it was not until 1767 that the lease of the second arch of London Bridge from the south side was granted to the London Bridge Water Works Co. for the purpose of supplying water to Southwark and South London generally, a water wheel being used for actuating the pumps. Southwark was also supplied with water from the pond of St. Mary Overie, and rivalry ran high between the two companies.

### Wooden Mains Replaced by Iron

In 1820 the water rights originating from St. Mary Overie were purchased by a Mr. Edwards who, in 1882, bought the south side rights of the London Bridge Water Works Co. from the New River Co. Uniting the two under the name of Southwark Water Works, he laid down steam pumping engines and replaced the wooden mains by iron. The daily pumping capacity of the plant was 4 mil.gal., but the daily demand was

only 1½ mil.gal., and this was confined to 2 mi. from the works.

The South London Co. was formed in 1805 and obtained Parliamentary powers in July of that year. Trouble was soon experienced due to lack of capital, and a remedy was sought under the powers of another act in 1813. Shortness of cash seemed to follow the company for years and the trouble was accentuated by the shortsighted adoption of wooden pipes which soon afterwards were replaced by iron.

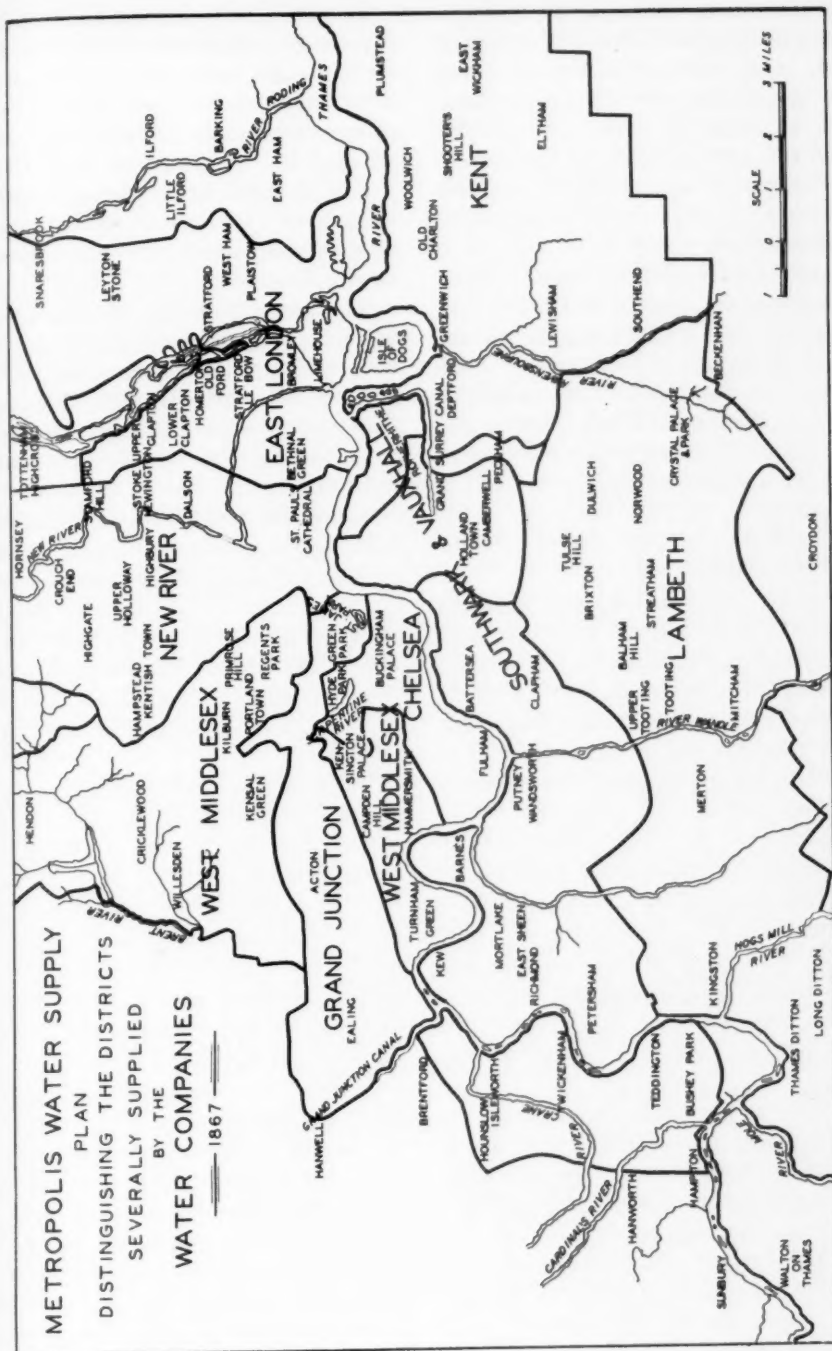
In 1822 a 45-hp. engine was installed at the principal pumping station of the company, situated on the south side of Kennington Common, near Vauxhall, and another engine was installed at Cumberland Gardens, near Vauxhall Bridge. The Kennington Common station had an area of 5 acres and had two reservoirs into which Thames water flowed, the joint capacity being a little under 4 mil.gal. A third reservoir was added, making the capacity 6 mil.gal.

### Competition Experienced

Keen rivalry and somewhat unfair competition were experienced from the Lambeth Co., but both were put on the same legal footing under an act of Parliament in 1834. Union was affected between the South London Co., then known as the Vauxhall Water Works Co., and the Southwark Co. in 1845, under the title of Southwark and Vauxhall Water Works Co., and a pumping station was erected at Battersea.

A decision to remove to Hampton was made in 1851 and an act was obtained for the purpose in 1852. Additional pumps were installed at Battersea in 1856-58, and further extensions were made at Hampton in the years 1862-67. Four covered reservoirs,





with necessary pumping plant, were commenced at the Peckham station in 1871, while 1881 saw the beginning of a new well at Streatham. Hampton was the scene of extensions in 1884 and 1886, and in the latter year an act of Parliament was obtained to enable a main to be laid from Hampton to Nunhead, and a reservoir to be made at Forest Hill. Wandsworth pumping station was erected in 1891 for the supply of Forest Hill and district, and was subsequently closed down in 1924.

Towards the end of the company's career, wells were sunk at Merton and at Honor Oak. Further extensions were also made to the filter beds at Hampton.

### Area Included

The area supplied by the company included Southwark, Barnes, Kew, Wimbledon, Wandsworth, Mortlake, Kennington, Newington, Lambeth, Clapham, Bermondsey, and Battersea. Some of the places here mentioned were shared with other companies—Lambeth and Kent.

*Lambeth*—Lambeth Water Works Co. appears to have been founded by men who had plenty of what in modern parlance is called "push and go." The first meeting of the company was held in April, 1785, and yet by July 9 of the same year the royal assent had been obtained to their act of incorporation.

The first pumping station was adjacent to the site of the southern end of the present Hungerford Bridge—and was nearly opposite Hungerford Market. The engine was a small one and the highest pumping service obtainable was 42 ft. above the Thames high water mark. Distribution was served by wooden pipes.

Demands from Lambeth and district caused an expansion in the business, even though many tried to get water without payment. In fact, a most progressive policy for those days was adopted by the company, and in 1802 it was decided to lay down a certain number of 10-in. pipes each year. In 1816 wooden pipes were abandoned in favor of iron.

The year 1805 saw a new 24-hp. pumping engine installed at the station, and the same year saw the beginning of relations with the South London Co. which, though friendly at first, became embittered as the years went on.

A decision to buy land at Streatham Hill and to install "a filtering apparatus" was made in 1831, while two years later the site of the present Brixton pumping station was purchased and a new main laid to the reservoirs constructed there. Increase of capital to £134,800 was sanctioned by the Act of 1834.

In pursuance of the company's progressive policy it was decided in 1847 to construct new works at Ditton, and Parliamentary sanction was obtained for this in the Act of 1848, which also sanctioned re-incorporation. The new works were opened in 1851 and their opening marked an era in the history of London's water supply, for this was the first attempt to get water above the tideway. The same year Parliament made it obligatory on other companies to do the same—remove all intakes above the tideway. Experience showed that Ditton was not an ideal spot, as the water here was found to be discolored when the rivers Mole and Emmett were in flood, and a further act, obtained in 1871, enabled a move to be made to West Molesey.

*Grand Junction*—The Grand Junction Water Works Co. was an offshoot of the Grand Junction Canal Co., and its original purpose was to supply water from that canal to Paddington and its environs by Parliamentary sanction obtained in 1798. Little was done until the years 1810–11, when further Parliamentary powers were obtained to enable the water works company to function separately from the canal company.

The water works company at first used stone pipes for distribution purposes, but after a short experiment in which a considerable amount of money was lost, the use of stoneware was abandoned and recourse was made to cast-iron pipes.

#### Plan for Using Canal Water

The original design for using canal water was found to be undesirable, and land was obtained at Chelsea adjacent to the Thames for a supply of water from the river. In 1835 Parliamentary powers were obtained, under which Kew Bridge Water Works were established, but in 1852 a decision was made to remove the intake to Hampton, consequent on the prohibition of all intakes on the tideway. The Hampton station was the company's principal source for its water, and before the end of the last century about 20 mgd. were abstracted, 14 mgd. of which were pumped to Kew Bridge for further distribution.

*West Middlesex*—The genesis of the West Middlesex Water Works Co. was contained in a scheme to supply water to the west end of London. The projected area included Paddington, part of St. Marylebone, Kensington and Hammersmith. Parliamentary powers were obtained in 1806, but dissension between the governors and the

engineer held matters up for some time. Works were constructed at Hammersmith in 1807, wooden pipes being used initially for distribution purposes. These were soon discarded and stoneware pipes substituted, but towards the end of 1808 cast-iron pipes were adopted.

A reservoir capable of holding 3½ mil.gal. was constructed at Campden Hill in 1809, and another, with 4½-mil. gal. capacity at Barrow Hill, near Primrose Hill, in 1825, supply being afforded from the Hammersmith pumping station. In 1838, subsiding reservoirs were constructed at Barnes. The enterprise of the proceedings for those days was illustrated by the fact that Hammersmith pumping station was fed by means of a sub-river pipe from Barnes.

The next important development was the construction of the Hampton Works, which took place in 1855, consequent on the decision to prohibit intakes on the tideway. Water was pumped from Hampton to the Barnes reservoirs. In 1866 further powers were obtained to enable supplies to be given to Willesden, Hampstead, Hendon and part of Acton. A reservoir was constructed at Finchley in 1868, and in 1871 a further 36-in. pipe was laid under the Thames from Barnes to Hammersmith. In 1896 two reservoirs were opened at Barn Elms and two others in the following year.

*Staines Reservoirs Joint Committee*—An important step forward was taken in 1896 when the Grand Junction, New River and West Middlesex Companies took joint action to obtain an act of Parliament authorizing the construction of two Staines storage reservoirs. The work was commenced in 1898 and water was first taken from the reservoirs on December 28, 1904.

### Transition

The granting of powers to a number of companies, in many cases with boundaries ill-defined, hardly defined at all, or positively conflicting, was no doubt due to the desire to provoke a healthy competition among the various companies and render the supply of water abundant and cheap. It was with this view, too, that Parliament, when giving powers to the West Middlesex Water Works Co., for example, to extend their district, inserted a clause preventing them from selling or disposing to any other water company the right of supplying the parishes mentioned in the act. For a time the policy was successful, and fierce competition raged. But this state of things did not last long. Amalgamation and agreement were the two weapons used to thwart the intentions of Parliament. Districts which were legally within the limits of two or more companies were arbitrarily divided by the companies between themselves, and before long the supply of water in London had practically become a monopoly.

### Companies Consolidated

In 1850 the General Board of Health, which had recently been constituted, reported on the subject of London's water supply and recommended that the Thames should be abandoned as a source. The board also expressed the opinion that one combined management for the whole of the companies should be substituted. At that time there was no body exercising power over the whole London area or the board would have recommended the transfer of the water supply to that body. The Home Secretary referred to a commission of three scientists this report of the General

Board of Health, together with evidence taken before a select committee of the House of Commons during the session of 1850 on the River Lee Trust Bill. As a result of these reports, a bill was introduced in 1851 to amalgamate the companies and place the work done by them in the hands of a specially appointed board.

The bill is of historical interest as it was the first attempt since early Jacobean days to introduce municipal legislation in connection with the water supply of London. The bill passed its second reading by a small majority and was referred to a committee of the House. While this committee received a good deal of evidence it did not issue a report, and the bill was dead.

### Act of 1852

Next session, however, a bill which left the companies practically untouched was brought forward by the commissioner of works and passed into law as the Metropolis Water Act, 1852. Some of its provisions were interesting. All water drawn from the Thames for the metropolis water supply was to be taken above Teddington Lock, and if the water of any of the Thames tributaries was used it was not to be taken from anywhere below where the tide flowed. All water for domestic use was to be effectively filtered except such as was drawn from deep wells. All the filtered water reservoirs within a 5-mi. radius of St. Paul's were to be covered over, and no water was to be conveyed except through pipes or covered aqueducts unless it was filtered before distribution. No water should be taken from any new source except on the approval of the Board of Trade. These were the main provisions, and as a result of the steps taken in compliance with the act a purer water supply

was secured. Credit should be given to the Lambeth Water Works Co., which had removed its intake above the tideway prior to the report of the Chemical Commission.

The Act of 1852 apparently failed to remove the chief causes of discontent with regard to London's water supply, the chief of these being that the provisions in the Act as to constant supply were practically valueless. In 1866 another royal commission was appointed to ascertain "what supply of unpolluted and wholesome water can be obtained by collecting and storing water in the high grounds of England and Wales, either by the aid of natural lakes or artificial reservoirs, at a sufficient elevation for the supply of large towns; and to report, firstly, which of such sources are best suited for the supply of the metropolis and its suburbs; and secondly, how the supply from the remaining sources may be most beneficially distributed among the principal towns." This reference was subsequently extended "to inquire into the present water supply to the metropolis, and whether there are other districts, in addition to the high districts of England and Wales, from which a good supply of unpolluted and wholesome water can be obtained."

Several schemes for supplying London with water were proposed, one of which was J. F. Bateman's plan for the utilization of the water of the sources of the Severn.

The commissioners' report in 1869 may be summarized as follows:

1. Mr. Bateman's scheme to bring water from Wales was feasible and practicable, and that by it a large supply of water might be obtainable for the metropolis.

2. The existing sources of supply available from the Thames basin were ample for all the wants of any possible increase of the metropolitan population.

3. There was no evidence to lead the commission to believe that the quality of the water then supplied was not generally good and wholesome, and that when efficient measures were adopted for excluding sewage and other pollutions from the Thames and the Lee and their tributaries, and for insuring perfect filtration, water taken from the present sources would be perfectly wholesome and of suitable quality for the supply of the metropolis.

4. A probable increase of population to 4,500,000 or 5,000,000 might at some very remote period have to be provided for, and that 200 mgd. was the "highest demand" that need be reasonably looked forward to for the metropolitan supply.

5. A constant supply of water ought to be promptly introduced, but this system could not be effectually carried out in the hands of private companies.

6. The general control of the water supply should be entrusted to a responsible public body, with powers conferred on them for the purchase and extension of existing works, and with powers for levying the necessary rates.

The conclusions of the commission relating to the general control of the water supply were as follows:

That it is a matter of vital importance that an abundant supply of water should be provided for all classes of the population, as well as for general public purposes, street watering and cleansing, public fountains, and extinguishing fires.

That for these purposes there should be a power of levying, as at Manchester, Glasgow and elsewhere, two rates—one a special or domestic rate on all dwelling houses, the other a public or general rate upon all rateable property.

That no trading company could be permitted to levy or expend such compulsory rates, and that therefore the future control of the water supply should be entrusted to a responsible public body, with powers conferred on them for the purchase and extension of existing works, and for levying the rates referred to.

That this plan offers the only feasible means of introducing efficiently the system of constant supply and for securing a compulsory supply to the poor. We believe that it would tend to economy, to the improve-



ment of the quality of the water, and to ensure the proper provision for public objects and for extinguishing fires; and that it would increase the probability of beneficial results from the purification of the Thames.

It will be noted that the sixth conclusion of this royal commission was that the general control of the water supply should be in the hands of a responsible public body. The commission did have some result in that the Metropolis Water Act, 1871, was passed. This act contained provisions for extending constant supply with requirements as to proper fittings, etc., for the appointment of a water examiner to see that filtration of domestic supply was properly worked, and for the auditing of the companies' accounts. Some of the weightiest of the recommendations, however, were ignored and there was no attempt to carry these into effect until 1878, when the Metropolitan Board of Works introduced two bills. One based upon the dual system referred to by the commission, sought authority to provide a new constant high-pressure service for drinking and cooking and for extinction of fires.

### The London County Council

The year 1889 saw the coming of the London County Council, and that body at once recognized that the question of London's water supply was one of major importance. It appointed a water committee to look into the matter, but found that the council labored under the same disability as the Metropolitan Board of Works with regard to the expenditure of money for the inquiries necessary. As a result, the council, in its General Powers Bill, 1890, obtained power to spend £5,000 in prosecuting inquiries and conducting negotiations with regard to water supply.

Sir Matthew White Ridley's Select Committee, as a result of their further inquiries, recommended: (1) that powers should be granted to the London County Council to expend further sums for exploration purposes; (2) that the London County Council should have power to promote a bill or bills in Parliament for the purpose of constituting themselves the responsible authority for London acting through a statutory committee along the lines of the agreement with the City Corporation; (3) that the London County Council, if constituted the water authority, should be required to purchase, either alone or in conjunction with such of the authorities of the outside areas as may be arranged, the undertakings of the eight water companies (except, possibly, certain lands of the New River Co.); (4) that, subject to such arrangements, the new water authority should take over the duties and obligations of the companies in the districts outside the boundaries of the county of London; (5) that the new authority should settle matters of detail arising from distribution in the area of local authorities; (6) that authorities like Croydon, Richmond and Tottenham, then independent water supply authorities, should be guaranteed their independence.

As a result of the attempts of 1891 and 1892, yet another royal commission was appointed in 1892. It reported, in 1893, to the effect that the population in 1931 might be expected to be 11½ million, with an average daily demand of 391,717,690 gal., and a maximum daily demand of 415,219,752 gal. The meticulous exactitude of the latter figure would have made Professor John Perry, the father of practical mathematics, smile, for what are 752 gal. compared with 415 mil.gal.?



The royal commission reported further that to cover this amount 420 mgd. might be expected to be obtainable from the Rivers Thames and Lee and from the wells in the area. But the royal commission could hardly be expected to see the trend of birth limitation in the twentieth century. Instead of the population being 11,250,000 in 1931, it was approximately 7,000,000. Nor was the commission correct with regard to the expectation of consumption. During the immediate prewar years the consumption figures of 392 mgd. had not been attained, but the daily demand during the drought of 1933-34 exceeded 350 mil.gal. on 16 days. The forecast maximum daily supply of 415 mil.gal. was not reached during the prewar years, the nearest being 410.6 mil.gal. in June 1939. In addition to the change of habits with regard to the number of births, a habit that one hopes will be changed once again should the Beveridge Report be implemented, there is the further change of habit with regard to the greater user of water. While during the war every effort for the sake of fuel economy has to be made to cut down water consumption, it still is true in normal times that the use of water is the index of civilization, and after the war one must expect that the *per capita* consumption must increase. This need not be surprising seeing that in all postwar housing ample provision must be made for copious supplies of both hot and cold water for bathing and other domestic purposes.

The first London County Council Welsh water scheme proposed to take water from the watersheds of the Usk, Wye and Towy, which were estimated to yield an average supply of 415 mgd. These streams suffered from the same

complaint as did many other streams in this country—a liability to cease their flow entirely in times of drought—and to meet this situation large impounding reservoirs were to be arranged. The largest of these was to have a capacity of 38,000 mil.gal., and was to be situated on the Llangorse. The next largest was to have a capacity of 31,000 mil.gal. and to be located on the Yrfron. Reservoirs on the Upper Wye, Ithon and Edw were designed with capacities of 10,500 9,000 and 4,400 mil.gal., respectively. The sum total capacity of all these reservoirs would have been 92,900 mil.gal. or, approximately a seven months' supply. In addition, three compensation reservoirs were to be provided for restoring water to the streams during times of drought.

### Metropolis Water Bill

It is a very moot question as to whether the Welsh supply would have been the best that could have been obtained. True, it would have eliminated many of the problems that arose in the use of Thames water. The raw material would certainly have been of purer quality, but there would have been the question of the maintenance of long aqueducts to be considered. While these need not necessarily have given London more trouble than do similar aqueducts for the water supplies of Glasgow and Manchester, it is comforting to know that during the war London has not had the possibility of sabotage of a 100-mi. long aqueduct in connection with its water supply. True, we are not always at war. True, too, that many of us hope that war and the dread of war, will be vanished for many years to come, if not entirely, but the possibilities of war may remain as long as fallen humanity is still fallen.

The fate of the water supplies of Singapore and Hong-Kong is too much before one's eyes for a similar fate even to be contemplated for London and its water supply.

In 1902 the century-old struggle came to an end, and on January 30 of that year the Metropolis Water Bill was introduced. After many vicissitudes in Parliament and in committee, the bill became law under the title of the Metropolis Water Act, 1902.

This act provided for the establishment of a board to be called "The Metropolitan Water Board," to take over the undertakings of the water companies on terms to be settled, if necessary, by arbitration, and generally for the purpose of supplying water within an area that differed in some respects from that within the limits of the actual and potential supply of the companies.

The effect of this act was that for the future the administration of the water supply of London was to be run in the interests of the whole of the citizens of London. In other words, that which the Corporation of the city of London had declined to do in 1607—institute a municipal water supply—was done on a larger scale by the Metropolis Water Act of nearly three centuries later.

### Abundant Water Supply

From June 24, 1904, onwards, for good or ill, "Water London" has been under the control of the Metropolitan Water Board, with the result that today, "Water London" rejoices in a better, purer and more abundant water supply than it had ever possessed before throughout its long history.

The Board did not start under any too happy auspices. The London County Council was naturally not

pleased that the Board and not the Council was to be the water authority. To the credit of the Council, however, it must be said that it placed at the disposal of the Board every facility for which the Board asked. Other people were not pleased. Many friends of the companies thought they had had a raw deal given them. Among the general public some thought of the Metropolitan Water Board as a certain animal concerning which the remark has been passed that it is without the pride of ancestry or hope of posterity. The Board's unpopularity was enhanced when, in 1907, it sought to straighten out the muddle of water charges, and non-public-minded persons in the city and West End, rather than pay their proper water rate contributions, sunk wells to avoid the payment, totally ignoring the fact that the Board's mains and supply afforded them protection from fire, to which, incidentally, they were not contributing one penny in water rate. It is only in recent years that the unpopularity of the Board has decreased to any marked extent, and one good effect of the war has been the way in which the public of London has responded to the appeals for co-operation that have been made. Today it may be fairly said that the Board enjoys more popularity than was ever the case previously in its career.

The Board is composed of 66 members, 14 of whom are appointed by the London County Council; one each by the county councils of Kent, Surrey, Middlesex, Hertfordshire and Essex; two each by the Corporation of the city of London, the Council of Westminster and the Council of the county borough of West Ham; one each by the remaining 27 metropolitan boroughs; one each by the councils of the county borough of East Ham and the

Borough Council of Leyton and Walthamstow, the Thames Conservancy, the Lee Conservancy; and several groups of municipal authorities outside the county of London, each group returning one member to the Board. The term of office is three years and the present board is the thirteenth, being appointed on May, 1943, and holding office until the end of May, 1946.

"Water London," the area supplied by the Board, is a most irregular area and one for which there is no logical reason other than it was the area supplied by the eight former water companies. In it there is an enclavement—Richmond—which receives most of its water in bulk from the Board but is its own distributor. Other authorities supplying the Greater London area are: South West Suburban Water Co., Richmansworth & Uxbridge Valley Water Co., Uxbridge Urban District Council, Colne Valley Water Co., Barnet District Gas & Water Co., South Essex Water Works Co., Croydon Corp., East Surrey Water Co., Sutton District Water Co., Epsom & Ewell Corp., West Surrey Water Co. and Richmond Corp.

### Thames Valley Storage

Thames water is pumped to one of the Board's storage reservoirs situated in the Thames Valley. The total storage capacity of all the Board's reservoirs of this type was 19,560 mil.gal. But for the war, three other reservoirs would by now have been constructed. The total storage capacity when these are completed will be approximately 32,000 mil.gal.

On a prewar basis of supply this would be equivalent to 106 days' reserve without taking in more from the Thames or Lee, but, although pro-

posals like the County of London Plan and the Greater London Plan are on hand with possible dissipation of population, there is doubt as to whether the demand on the Board's supply will diminish. Every new house or flat replacing an old house or tenement will undoubtedly mean an increase in water demands.

### Miles of Mains

To give passage from the pumping stations to the storage reservoirs, from the storage reservoirs to the service reservoirs, and from the service reservoirs to the consumer's tap, many miles of mains of various sizes are required, these being approximately 8,275 mi. in length. The mains range from 54 in. down to 3 and 4 in. From these mains communication pipes to consumers' premises are run. Prior to April 1, 1933, all communication pipes were the responsibility of the consumer, and in some cases real hardship was suffered by consumers when these communication pipes burst. Under Secs. 3 to 12 of the Metropolitan Water Board Act of 1932, the responsibility for these communication pipes transferred from the consumers to the Board, subject always to the first cost of installation being borne by the consumer. This transfer of responsibility for upkeep from the consumer to the Board conferred a very real benefit on the millions of consumers in "Water London."

The interest paid by the Board during 1938-39 on stocks and loans was £1,726,471, which, together with annuities and rent charges, amounts to £1,734,954. The net water rental during this year was £5,417,555, of which approximately £3,600,000 was derived from domestic water charges.

It can therefore be said that of the £1,734,954 paid by the Board in respect of interest and annuities, £1,152,888 was derived from domestic water charges or, in other words, approximately 1.75 per cent of the domestic water rate of 5.75 per cent went in interest and annuities, which left 4 per cent towards the rest of the expenditures of the Board. It is not proposed to discuss here the economics or morality of interest *qua* interest, but to let the facts speak for themselves.

When the Board commenced its operations it continued the scales of water charges inherited from the companies, these varying from 3 to 7.5 per cent on the net annual value, with various additions. Under the Metropolitan Water Board (Charges) Act of 1907, the rate was fixed at 5 per cent, over the whole area, with the right conferred on the Board to levy the various rating authorities within its area to make good any deficiency that might arise. Starting with a deficiency of £25,279 in 1908, 1921 saw the startling deficiency of £1,925,338, with the result that rating authorities were in revolt against the necessary percept levied upon them. This state of affairs was remedied by the Metropolitan Water Board (Charges) Act of 1921, under the provisions of which the Board was given the right to increase its charges up to 10 per cent, subject to the consent of the Minister of Health. In 1922 8 per cent was charged, and at different periods was reduced until, in 1939, it was 5.75 per cent. Since that period the charges have risen to 8.5 per cent—the maximum that can be charged without the consent of the Minister of Health—and it has required special efforts to maintain it at this figure.

## Wartime Experience

A report on London's water supply at the present time would be incomplete without some reference to wartime experiences. Questions of national security forbid too explicit and too complete references, but certain things are allowed to be mentioned. For instance, the Right Hon. Herbert Morrison, Secretary of State for the Home Department and Minister of Home Security, was able to state when he visited the Board on October 22, 1943, that up to the end of October, 1940, 3,000 mains of all sizes had been smashed due to enemy action, and he congratulated the Board on the restoration of all those mains shortly after the end of that month. However, this by no means tells the whole story concerning mains broken by enemy action.

In the time prior to the war, the Board had not been idle. Due preparation had been made for enormous stocks of mains to be laid in—so enormous that had the Board's stores officer acted in a similar way in peacetime, I would have felt compelled to recommend his dismissal. Under the circumstances there was nothing but praise for his action.

## Stopping Waste

Even the worst of things brings some good in its train, and the war has had a good effect with regard to the relations between the Metropolitan Water Board and its consumers. It may be that the interruptions to the service, which the Board endeavored to keep to a minimum, have brought home to the average London water consumer the really good service that was theirs in normal life. At all events, the relations are much better, fewer complaints are received, and the

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response to the Board's appeals for co-operation in the direction of water economy was generous.

It must not be supposed that everybody practiced the same economy as was practiced by the highest in the land. Indeed it is doubtful whether the "five-inch bath" \* ever became the general practice, although to the joy of some small boys fewer baths were the order of the day. Generally speaking, however, there was a very real response to the Board's appeal. The aim was to lower consumption by 20 per cent below the prewar figure. This aim was not achieved but some remarkably low figures of consumption were reached. During 1943 whatever resolutions might have been made on January 1, it is clear that if those related to water economy they were not practiced to the same extent in the preceding years, and it cannot be too strongly pointed out that all the while the war lasts and longer the need for water economy is still with us. The aim of the Board is to supply every drop of water that is necessary, but it has never set out to supply a single drop to waste. An instance of the co-operation of the public is the response that was made to the Board's promise to supply washers to remedy leaky taps. No fewer than 315,908 washers were supplied free for the public to fix. The saving of water that resulted from this can easily be approximated when it is remembered that with a leaky tap having 30 drips per minute the loss is 1.1 gpd.; 60 drips per minute give a loss of 2.3 gpd.; 120 drips per minute, 4.75 gpd.; and 240 drips per minute, 10 gpd. Those are results obtained from

actual tests. Even on the slowest rate of drip mentioned there would be a loss of 401.5 gal. per annum. It would therefore appear that the water saved by the supply of these washers amounted to approximately 126 mil. gal. over a period of 20 mo. during which the washers were issued.

### Fuel Economy Campaign

The Board has taken an active part in the fuel economy campaign. As was mentioned earlier, every drop of London's water has to be pumped and, whether the prime movers be actuated by steam, electricity or fuel oil, it means that fuel is used for every drop of water consumed. Taking a low computation of  $1\frac{1}{2}$  tons of coal per mil. gal. pumped, the saving in connection with the leaky tap campaign would amount to 189 tons. Quite small, it is true, but added to the other economies the Board was able to effect, it took its place in the nation's fuel economy campaign. A special efficiency officer was appointed to see that the most economical use was made of fuel and there was active co-operation with the government in trying out and using inferior forms of fuel such as anthracite, duff, open-cast coal, etc.

For war purposes, the various water authorities in the London Civil Defense Region are working together on a committee known as "The War Emergency Water Committee of the London Civil Defense Region."

The work of this committee deals with all matters of common interest. Intercommunication of a higher order than previously practiced has been established between the various component authorities, enabling water to be diverted from one authority to another. Combined action has been taken in the direction of emergency plant which can

\* As part of the Water Conservation Program instituted in England in 1942, people were asked, in filling the bathtub, to use no more than 5 in. of water.



be used anywhere in the region, and combined action has also been taken with regard to other matters. Tribute is paid to the help so readily given to the Board by the other undertakings in the region during the London blitz. After the first two meetings, during which the committee was finding its feet, the proceedings have been marked

by cordial co-operation, and it is hoped this spirit will prevail after the war.

It may well be that in the consideration of the future water make-up of the country in general and of the London area in particular, attention will be given to the re-casting of the number of water supply authorities both in the country and in the London area.

The map of the Metropolis Water Supply shown on p. 713 and dated 1867, was made from one found in a volume published in 1869 entitled "Report on the Filtration of River Waters, for the Supply of Cities, as Practised in Europe, Made to the Board of Water Commissioners of the City of St. Louis, by James P. Kirkwood, Civil Engineer."

It should be of interest to water works men

### HAVE YOU OVERLOOKED IMPORTANT U-1 CHANGES?

Two important changes in WPB Utilities Order U-1 as amended January 22, 1944 [See p. 238 Feb., 1944 Journal] appear to have been overlooked repeatedly by many water works executives and regional engineers of WPB.

One of these is the broadening and modification of the definitions of *maintenance* and *repair* to permit minor plant additions up to \$1500 to be made without the approval of the WPB:

"Part IV(i) *Restrictions on use of material for minor plant additions.* A job which is a plant addition . . . rather than maintenance and repair, may be done without special permission from the War Production Board if it is a 'minor plant addition' . . . if net material cost does not exceed \$1500."

The second change which has had too little attention from either regional engineers or water works executives is the provision in Schedule D [See p. 249 Feb., 1944 Journal] that the only items required to be cleared through the regional utility engineers are:

1. Copper and brass tubing.
2. Bronze valves, smaller than 2 inches, except corporation cocks and curb stops.
3. Valves, cast iron and steel, 2 inches and larger.
4. Consumers meters.
5. Pumps.

**Note:** Neither cast iron pipes nor hydrants are included in the above list and therefore need not be cleared through regional utility engineers.





## The Promotion of Water and Sewage Works Development

By E. L. Filby

**A** COROLLARY to the old adage, "In time of peace, prepare for war!" may be phrased, "Now is the time to prepare for peace!"

True, the war is far from being concluded, but the amazing production feat of American industry and the determination of our fighting forces portend the early arrival of peace. Just when that eventful day will arrive we do not know, but late 1944 or early 1945 has been mentioned in Washington dispatches as a date associated with the end of the present hostilities in Europe. To the water works and sewerage profession, the planning and construction of service utilities good for years in the future have been standard practice. But for several years now, construction, other than for war needs, has been eliminated. The routine replacements, betterments, etc., have been impossible. We have "made it do—worn it out." Water and sewerage operators have not failed the war effort. Established utilities have met every demand, every load, every requirement of the war effort, and they may be justly proud of their accomplishments.

A paper presented on June 15, 1944 at the Milwaukee Conference by E. L. Filby, Field Director, Committee on Water and Sewage Works Development, New York, N.Y.

When Coventry was destroyed and London blitzed, the English, confident of the outcome of the war, started to design for reconstruction of their homeland. Water service piped to every home on the island became one of their goals.

In America also, a wave of interest in planning spread throughout the land. Everyone determined that the episode of the jobless veteran of World War I should not be repeated. Last year at the Cleveland meeting of the American Water Works Association, papers by Dr. Abel Wolman and Col. Willard Chevalier keynoted the role of public water supply in the postwar program. The New England Water Works Association had supplied the initial impetus through its Committee on Post-War Activities and it was decided to formulate a joint committee to see, if possible, that water and sewage works development were not "lost" in the maze of "master" city plans and "overall" regional development schemes. The N.E.W.W.A., acting through E. Sherman Chase of Boston and Roger W. Esty of Danvers, Mass., together with C. A. Emerson of New York and G. J. Schroeffer of St. Paul, Minn., representing the Federation of Sewage Works Associations, and C. H. Becker of Philadelphia and C. A. McGinnis of

New York, representing the Water and Sewage Works Manufacturers Association, joined with Samuel B. Morris of Stanford, Calif., and Harry E. Jordan of New York, respectively President and Secretary of our Association, to create the Committee on Water and Sewage Works Development. Dr. Abel Wolman of Baltimore was elected chairman of the committee and Harry E. Jordan, Secretary.

The committee, thus formed by joint action, decided to expand its effort through a field service. This field service, instituted on September 1, 1943, was designed to bring home to officials in charge of water and sewerage utilities the necessity of planning—planning in detail—designing NOW the anticipated peacetime needs of their utilities. The committee packaged its program with a label—BLUEPRINT NOW!—a slogan which would encompass its objective; namely, to stimulate thought *and action* on preparing today for the needs of tomorrow. The facilities and staff of the New York office of the A.W.W.A. were made available to the committee.

This paper, in general, is an account of the stewardship of the committee.

In setting up the budget, provision was made for limited expenditures over a one-year period. The budgetary requirements are being adhered to, although the experiences of the past year have indicated a very wide scope of activities that such a committee might well consider. Webster defines development as "disclosing that which is unknown . . . gradual advance or growth through progressive changes" and there are many fields such as labor relations and employee welfare in which organized effort by the industry might well bear fruit. But the prime objective of the committee has been to

create within the operator, the superintendent and the manager of water and sewage utilities, the desire to see to it that the needs of his utility are properly evaluated and considered in the postwar program of his community. If we could instill in the operating personnel a spirit of leadership—bold leadership, if you will—with a willingness to meet with other community leaders and to represent their essential service to the community, then we would accomplish our mission. If the spirit of leadership is functioning, then preliminary plans will be prepared, estimates made and detailed designs blueprinted, and in parallel procedure, financing will be studied and arranged or funds set aside to pay for the construction. In postwar planning, the water works man has a glorious opportunity to become a vital factor in the development of his community. Will he grasp this opportunity? Will he "let George do it?" Will he sit supinely by as an automaton awaiting wire pulling from Washington? The answer can be given only by each of you individually. It is *your* responsibility, *your* decision. You must "live with it" in the years to come.

The American way of selling an idea, of promoting a new product or activity, is to present it to the public through the media of the spoken word and printed page. We have followed the American way. After a few talks on the committee program, it was realized that the existing printed material designed for the water and sewage works man was not "attractive" enough to catch and hold citizen-interest. It was not designed to help sell "the powers that be." If a brochure were issued, it should be attractive, illustrative and non-technical. It must be a "professional" job, yet within budget-

any limits. The question arose: How were we to secure the professional services for such a brochure? A member of the committee, Mr. C. A. McGinnis, offered the services of the advertising staff of his organization and the brochure, "BLUEPRINT NOW for Tomorrow's Needs," was shortly rolling from the presses. Without such an admirable presentation of the importance of water works and sewerage in tomorrow's design for living, the program of the committee would have been materially impeded. Nearly 30,000 copies of the brochure have been distributed. It has been sent to water and sewage works officials in cities above 2,500 population, to city engineers of communities from 2,500 to 10,000, to private water companies in this population range and to consulting engineers specializing in sanitary engineering work. Distribution was also made at various meetings where the subject was presented personally and to interested persons who wrote in for copies. Distribution in Canada was handled through Dr. A. E. Berry of the Canadian Section of the A.W.W.A. The various state health departments were supplied copies for distribution by the state sanitary engineers and the manufacturers were furnished with copies for their field representatives.

From the cover of the brochure a small sticker was made for use on mailings, advertising material, etc. Several reprintings of this sticker have been made and approximately 134,000 copies have been distributed. Electros of the same design were made and distributed among the manufacturers of water works and sewerage equipment for use in their advertisements, etc. The electro was also utilized to overprint A.W.W.A. stationery—appearing in the

lower left-hand corner of each letter-head.

It may be of interest to report here that the sticker has been recognized as having merit in the general construction field and permission to use it has been requested by a large statistical organization interested in the general construction field. The sticker-electros have been offered also to the American Society of Civil Engineers' Committee on Postwar Construction.

The platform of the committee, the slogan and the idea of planning now for the future needs have been the theme of scores of advertisements in the technical press. The committee has received unstinted support, both in editorial and news columns, from all the periodicals associated with the profession, and this continuing support of the committee's program has indeed been most gratifying. To the various manufacturers of water works and sewerage equipment and to the technical press, may we here express our sincere thanks for their interest in, and support of, our program.

Presentation of the program of the committee was facilitated by attendance at A.W.W.A. section meetings and at such meetings as the annual meeting of the A.S.C.E., the conferences of the Federation of Sewage Works Associations, the N.E.W.W.A., the Texas Water Works and Sewerage Short School, etc. The subject of BLUEPRINT NOW was presented before 23 water works meetings serving 38 states, before 8 sewerage groups representing 11 states and before 5 water and sewerage associations representing 6 states. The topic was also presented to 11 engineering societies, public health groups, etc. The health departments in 37 states and 15 state planning groups were personally visited

as were city officials in 57 cities. In the past 10 mo., it has been found necessary to travel nearly 50,000 mi. to present the theme of BLUEPRINT NOW!

We have tried to prepare the ground. We have tried to sow the seed. We must now ask you to cultivate the crop and to reap the harvest of postwar development of water and sewage. The field service of the committee will soon cease. It was designed and scheduled for a certain job. It believes that job accomplished.

### Promoting Better Systems

The promotion of better public water supplies and sewerage systems, including treatment works, is the official duty of the engineering division of the state health departments and/or stream control commissions. It was logical then to plan the committee work in co-operation with and through the assistance of such official agencies. Local committees were established if their functioning was considered a desirable auxiliary to the work of the state sanitary engineers.

These men, long trained in methods of encouraging betterments in water supply and sewerage, and conversant with local problems and procedures, have recognized the opportunities of postwar planning and have actively participated in the work of state planning groups, etc., to secure the consideration of needed improvement in water supply and sanitary facilities. The active participation in the work by the state sanitary engineers and their field men has been exemplified by the work in New York, Michigan, Texas, Indiana, etc. All the states in the New England area were handled under one general committee for that area.

Another effective force utilized by the committee has been the sales representatives of the water and sewage works manufacturers. These men have often gone out of their way to promote the program. We have in mind one representative who has made several talks before Rotary and other luncheon clubs on the benefits of soft water and has urged prompt consideration of the BLUEPRINT NOW program through widespread use of the brochure.

### Program Outline

In advancing consideration of water and sewage works development in the postwar period, it was necessary to provide a skeleton outline that could be used as a frame upon which to build the ideal program according to local needs. The basic platform of the committee contained such an outline and the six basic items are:

(1) An appraisal of the needs for water and sewage works improvement or construction.

(2) The development of orderly programs for meeting these needs in an order related to their value to the city or the region.

(3) The preparation of detailed plans and specifications for the needs of first importance as soon as arrangements can be made.

(4) Consideration of, and development of methods for, funding the necessary construction.

(5) Re-appraisal of authority under which the contemplated projects can be carried on, as well as the legal basis for funding such operations (promotion of legislation whenever needed).

(6) Definite scheduling of the construction program (immediate purchase of land and rights of way in part of the projects).

There are, of course, as many variations of this program as there are local conditions, and adaptations of the suggested program have been many. In some localities, the policy has been: "Let's get out of debt and then plan for the future." In other localities, it has been: "Let's vote the bonds now and get the benefit of low interest rates." In other places reserve funds have been set aside from special taxes, from excess income, from utility earnings to pay for the postwar public works construction. Some 22 states now permit the setting up of postwar reserve funds. Revenue bond or authority financing is rapidly supplanting the general obligation bond. Sewer service charges based upon water use have just been adopted by Philadelphia. In some localities special design groups have been set up to design in detail the proposed works. New York City and Detroit are excellent examples of this, while in other localities such staff employees as are available have been put on postwar planning work or consulting engineers have been hired to prepare the plans and specifications.

There is no general pattern of procedure but there is one general result. The men engaged in the water and sewage field will be ready with a construction program for the postwar period. It may be "too little" but it will not be "too late."

### Public Works Useful

It is generally conceded that public works are a very useful "stop gap" or, as some express it, a bridge to span the period of unemployment which may develop as industry converts from war to peacetime operations and our armed forces are demobilized. The U.S. Labor Department estimates that in

1940 there were 45,166,000 persons gainfully employed in the United States and during demobilization we must plan to reabsorb 14,570,000 persons or 32.3 per cent of the 1940 employment in industry and gainful employment. They have also analyzed the data by states. In Michigan, Connecticut, Indiana and the state of Washington, the problem will be acute because of their tremendous wartime activities. Demobilization is not a long way off. Some 80,000 are being released from the Armed Forces each month now and governmental employees in wartime agencies are beginning to wonder if there is a way to "get in on the ground floor" of a permanent job. The water and sewage utilities can, of course, permanently absorb only a relative few, but in providing for postwar construction of needed improvements, they can afford a "tide-over" job for thousands of men and women in their home localities. Our veterans merit and deserve every opportunity to engage in gainful employment through their readjustment period and work at home is the quickest and easiest transition from military to civilian life.

In the *Engineering News-Record*, an analysis of prewar water works construction from 1925 through 1940 indicates the maximum yearly expenditure was \$163,000,000 in 1939 with a minimum in 1932 of \$35,000,000, whereas sewer construction, including treatment works, ranged from \$22,000,000 in 1933 to \$160,000,000 in 1939. The average for water works is practically \$80,000,000 yearly, for sewers, \$91,000,000 yearly. In short, the peak construction of \$323,000,000 in 1939 is nearly twice the average year which is \$171,000,000.

What then should be our goal of



plans, ready for contract letting if *unemployment at home develops?* \$400,000,000, \$500,000,000, \$600,000,000—or even a billion dollars of ready-to-go detailed plans? A goal should be set only at that point where water and sewage work is needed on the accepted future design basis common to such work, needed to carry a fair burden of the unemployment load. Water utilities normally only accounted for 3.5 per cent of the construction business and sewerage 3.6 per cent in this 16-year period so that we normally have a small but nevertheless potent part in the picture. Through May 31, the *Engineering News-Record* reported some \$326,000,000 of water works proposed of which \$169,000,000 were in process of design in the United States, with \$41,000,000 proposed and \$22,000,000 under design in Canada; in sewerage the figures were \$625,000,000 and \$304,000,000, and in Canada \$139,000,000 proposed and \$19,000,000 in the planning stage. We are off to a fair start with some \$514,000,000—160 per cent of the peak year's work "on the boards," or 3-years' normal work now being designed.

*Public Management*, the official publication of the International City Managers Association, states in the April 1944 issue on "Planning Postwar Improvements" (p. 102): "Cities were asked to list the first 3 major projects to be undertaken as soon as labor and materials are available. A total of 513 cities supplied data. Sewers and streets rank first in most cities regardless of size. More than one-half of the cities plan sewer construction and approximately one in four plans to build or make major improvements in sewage disposal plants. The percentage of cities in the 10,000 to 25,000 (69 per cent) and 25,000 to 50,000 (73 per cent) population groups that are

concerned with additions to their water systems is more than double the percentage of cities over 100,000 (30 per cent)." (Percentage inserts are from the table on the same page.) Sewers and sewage disposal are primary construction projects in Detroit, Los Angeles, Philadelphia, New York, Baltimore and Cincinnati. On the water works front, some outstanding projects are Chicago's filtration plant construction, Baltimore's, Philadelphia's and Cincinnati's system extensions, and Dayton's softening plant. In St. Louis main feeder construction and pumping station rehabilitation are postwar projects payable out of the water works cash-on-hand which now exceeds six million dollars!

But a good start does not necessarily portend an excellent finish. We must "keep everlastingly at it" until we have designed drawings, finances arranged and the decks cleared of all legal and business details. Then and only then are we "ready for action."

This is a large country, a country of varied topography, resources, people and policies, a country in which there is developing a resurgence of the pioneer spirit that built America—the spirit of independence, of determination to work out the home problems by the home folks with home financing. This spirit is more evident in the "grass roots"—the small towns and cities. It is less evident in the metropolitan areas. It is strongest in communities where people take a firm interest in the affairs of government. It is less evident where so-called machine politics dictate government. At the start of the BLUEPRINT NOW program the committee urged the policy of local responsibility, management and financing. It still advocates the policy that federal grants to municipalities for specific planning and/or construction

of normally needed local public works are not favored. We are proud to state that our policy is identical with that incorporated in the American Municipal Association Executive Committee's statement on postwar planning before the Lanham Committee of Congress on January 22, 1944. Our committee also filed with Congress a statement of its position of not favoring federal loans or grants-in-aid for postwar construction.

A significant "straw in the wind" is the statement made by Chairman Lanham, taken from the February, 1944 issue (Vol. VIII, No. 2) of *Southern City*.

"The states and cities must realize that the federal government will not take this job. We must get the word out to those cities with surpluses that they must do their own planning and works and must not wait for federal aid which they will not get. Send that message to the states and cities. The cities themselves must finance their own planning."

We have from the first advocated the utilization of a part of state surplus funds for assistance to the subdivisions of the state, for in many instances the state has taken upon itself most of the methods of raising funds. New York and Michigan have authorized payment of one-half of the cost of preparation of detailed construction plans but only up to 2 per cent of the cost of the project in New York. The New Jersey legislature has appropriated \$500,000 which will be allotted to municipalities for preparing detailed plans and specifications for local public works or improvements. It is believed that many states will provide for such financial assistance for planning when their regular legislative sessions are held. The Michigan law is in some respects superior to the New York law.

Again we reiterate: Every city in North America is entitled to have, and with good management is able to pay for, an adequate safe and satisfactory water supply, and as a good neighbor to other cities, likewise with good management, is able to dispose of its wastes in a manner that offends neither its own citizens nor its neighbor's citizens. Water and sewerage are two utilities that can be financed by rates or service charges and are not only self-supporting but self-liquidating. In this connection, it may be noted that management of these two utilities under one department may result in better financial status of both utilities and more economical operation. Akron, Ohio, is considered an excellent example for a medium-sized city and Fort Dodge, Iowa, for the smaller type community. The combination of the two utilities under one management should be a worthwhile contribution to postwar planning.

### Providing Funds

In presenting the program of BLUE-PRINT NOW, it has been surprising to find that generally the water works earnings become part of the general fund of the city and that in turn the water department must ask for budgetary allowances. Here is a situation that can well be corrected as a postwar development. How can the ideal of water works funds for water works purposes be secured? There is no one pattern of procedure but there is a method that in time will reach the desired goal, and that is through improved public relations. Water supply and distribution being generally a monopolistic function of government, there has developed an attitude of ignoring the public—the stockholders,

if you will—of the utility. Rarely is an understandable annual report rendered them. The details of the system are seldom called to their attention and the magnitude of the water business, its effect on their health, comfort and welfare, often remain sealed in the minds of the management. The conservation program proposed as a war effort was not well received by the public because they knew little of the background of the water works and why it was desirable not to waste water. In planning a long-range water and sewage works development might it not be good strategy to take the public into your confidence? Why not tell them about your system, your accomplishments, your needs? On every hand, we hear the war comment: "Why don't they tell us these things? We can take it!" So it is in peace. If the public know your utility, your efforts in their behalf, your problems, they will appreciate your situation and when you ask their support, it will be forthcoming.

### Results of Poll

In Miami, Fla., a newspaper poll revealed that of all the proposed postwar public works projects, sewerage topped all the rest. In Portland, Ore., the electorate, acquainted with the pollution of the Willamette River, voted to issue \$12,000,000 in bonds to clean up the situation and now detailed plans are being prepared. In Port Huron, Mich., residents approved construction of a new \$730,000 water filtration plant in an "advisory" vote sponsored by the city council. More than 2,800 votes were cast in favor of the proposal and 844 against it, the total exceeding the number of votes cast in the preceding regular municipal election.

With good public relations, the sup-

port of the public to the postwar and peacetime program of water and sewage works development will be assured. Let us change the spelling on that omnipresent sign from *Complaints to Compliments* and mark that window *Cashier* instead of *Pay Here!* When the water works man becomes a leader in his community, we are well along the road of successful promotion of our program.

### No Time for Stand-Patters

There are some men in the water and sewage works profession who need to be literally and actually blasted from their complacency. Everything is all right. Everything is going smoothly. Why stick your neck out? You and I know men of this nature, but they are not here. They are not interested in postwar planning. What can be done to arouse them from their lethargy? In many instances the answer is that nothing can be done. But somewhere in their organization there will be a chap with ambition, with get-up-and-go instinct, who is interested in the advances of the science of water, its production, treatment and distribution. If we can kindle that spark of enthusiasm, we will soon find our self-satisfied friend has been retired and new management has taken over. And here is a phase of postwar planning you, yourself, can blueprint now—the personnel situation in your utility! We all know that water and sewage service must continue to function, yet how many of our utilities are really "one-man" systems? Have you an understudy, qualified, experienced and trained to take over? The telephone, gas and electric utilities are continuously bringing men up through the ranks to key positions. They are continuously benefiting by new infusions

of enthusiasm, interest and "know-how." It must be admitted that civil service has a "deadening effect" but that can be overcome by intelligent programming. To the ambitious, the top rung in Xville is but the bottom rung in Y city. There are good men in public service. There will be good men in public service. Are your men the best you can get in public service? Let us do some postwar planning for water and sewage personnel.

There has been mentioned the possibilities of postwar water and sewage works development along construction, management and personnel lines. Interest is evident in all these but the prime objective is to plan now for jobs for our returning veterans—jobs that can be filled by Tom and Dick, by Mary and Joan—jobs for your sons and daughters. Water and sewage utilities offer a wide variety of jobs—skilled and unskilled, technical and non-technical, indoors and outdoors, big jobs and little jobs—all will help rehabilitate our veterans and add to the efficiency and service of our utilities.

In editorial comment, the *Engineering News-Record* of March 23, 1944, says:

"... the postwar challenge is to prepare projects so that a large volume of work can be undertaken immediately following the cessation of hostilities or when unemployment rises. Are water supply projects being readied for this purpose? The answer is yes. Latest statistics show that already \$240,000,000 of proposed work has been reported to *Engineering News-Record*, and of this total, plans and designs are underway on \$60,000,000 of work. Not only is almost an average year of work being blueprinted now, but four times this amount is scheduled for such action. Here is clear evidence of the aggressive, intelligent promotion activities of the Committee on Water and Sewage Works Development. The committee is to be congratulated on its efforts, and should

find satisfaction in knowing that 'BLUEPRINT NOW' is no longer a slogan but a reality."

But we are not yet satisfied and will not be satisfied until every water and sewage system from those metropolitan in scope to the smallest prairie hamlet has a program all financed, blueprinted, arranged and ready for action! Impossible? Not at all, for if you develop your program, if you set aside funds to build it, if you "sell" your board and your public on the needs of water and sewage utility, then you will square your shoulders and proudly assert that the water and sewer departments are ready to go and then your accomplishment will be as a light upon a hilltop, a guiding star to men in similar positions everywhere. You will be proud that you have helped BLUEPRINT NOW!

Paul Hansen, in one of his last public appearances, expounded the thesis that today engineers have the time and personnel to study your needs and to determine the proper and economical solution to your utility problems without hinderance to the war effort. It is sound advice. *Now* is the time to get out the detail drawings for your postwar projects. *Now* is the time to plan that hydrant paint and check-up job, that record study of the distribution system, that meter overhauling program. *Now* is the time to set aside finances for that new mountain supply, for that water conditioning plant you have known the need of for so many years. *Now* is the time to get that right of way for the new feeder mains, to acquire the site for that ground or elevated storage. *The Time for Talk Has Run Out. The Time for Aggressive Action Is Now.* The Time Is HERE to BLUEPRINT NOW!



## Good Water Works Management

By Wendell R. LaDue

**I**N these times of war stress, and in the postwar years to follow, the great need of the peoples of our countries will be for trained and fearless leadership free to provide our citizens with an intelligent and economical management of those activities which have become generally accepted as normal and routine. In no place will this be more essential than in the municipal-utilities field, and particularly in that of water supply management.

The need for a study of top management and the determination of good practice in this phase of water utility endeavor has been very forcibly brought to the attention of the members of the American Water Works Association in the past few years. While perhaps not designated as such, there is probably no topic which water works men discuss more than "management," projected under such subjects as: continuity of employment, control of water works funds, consumer relationship, adequate plant planning, enabling legislation, etc.

These discussions often arise from the premise that inadequate attention has been given to underlying and con-

A paper presented on April 20, 1944, at the Canadian Section Meeting, Niagara Falls, Ont., Canada, by Wendell R. LaDue, Supt., & Chief Engr., Bureau of Water and Sewerage, Akron, Ohio, and Chairman A.W. W.A. Committee on Water Works Organization.

tributory factors. In other words, we discuss the *results* of bad management rather than its *causes*.

All in all, water works management covers a wide but very specialized experience in a field most necessary for human endeavor, involving the handling of a material, commodity, service, or whatever you may call it, for which there is no known substitute. Good management results in, and is the result of, a logical, sane policy of plant expansion, sound financing, efficient administration and satisfying consumer relationship. Good management is as essential to the small village system with a handful of employees as it is to the large organization employing hundreds of men and serving thousands of consumers.

### More Than Routine

All too often management is considered to be the more or less routine operation behind the delivery of a supply of potable water to the consumer's tap. It is far more than that. It embraces sound planning for the future and the co-ordination of these future needs with the financial ability of the utility to provide them. It provides a smooth routine of continuing operation so that when future needs become urgent, adequate planning (both physical and financial) has already foreseen and made possible the carrying out of



those needs with the least possible disturbance to the utility and its customers.

The water works profession can do much to improve its own status if it can effect a desire among the average citizens for a better top management. Management is greatly affected by the fundamental type of civil administration under which it must function. Whatever form of management is employed, there are various checks, some good and some bad, under which it is obliged to function. There is first the basic law of the state (or province) to which political subdivisions possessing public utilities must comply. The basic laws of the various minor political subdivisions provide further for a wide variety of checks and balances. As a consequence, public utility management may well cover several forms, depending upon its size (volume) and extent (territory) as follows:

1. *Districts, authorities or commissions independent of local municipal governments.* These have arisen principally as a method of administering self-supporting utilities. Ordinary financing within the municipality's tax structure confuses the issue. Likewise, such organizations provide an easy way for two or more political subdivisions to act in unison. As a rule, they are a state subdivision, topping municipalities.

The metropolitan districts serving Boston, Mass., and its suburbs, and the southern California district, serving the area adjacent to Los Angeles, are notable, successful examples of this form.

2. *Board or commission organized within a single municipality to handle the utility, independent of the general city government.* Here the consideration is one of financing, and especially

of credit, with the question of mortgage revenue bonds vs. city general obligation bonds entering. Such a commission usually consists of three to five men, with overlapping terms of such lengths that no one political administration can upset the board's continuing policies by a majority of new appointments. Its efficiency of operation rests on the fact that it owes responsibility to none but the general public. Being outside of a general political administration, its continuity of service is assured, and, serving in a somewhat advisory position, it attracts representative citizens from various walks of life who are interested in the civic welfare of the community. It is in a position to establish a high standard of operation and efficiency.

Briefly, this form results from the desire of the citizenry to separate a self-supporting, going concern from the vagaries of shifting local politics, with protection of utility funds as a primary object. Conflicting basic laws often prevent the fulfillment of this latter object. However, this form is enjoying a well-deserved expression of confidence and a growing popularity.

3. *City-manager and commission form, with many variations.* Briefly, this type of management, as it affects water works, is definitely limited by the capability of the city manager. Many smooth-running water works organizations have been deprived of excellent leadership by a city manager who thought he was selected to perform actually the managerial duties of all city departments without the assistance of tried, trained and capable public servants.

4. *Mayor-and-council form.* In this the main difficulty is to secure freedom of action and to recognize the necessity

for segregation of funds for use of the utility only. Here strong basic laws are required to protect the utility from its "friends" within the administration. The personnel of city councils is shifting continually, with the result that any centralization of top authority is slight or difficult. There is great danger that expedient "present" policies will prevail over efficient "future" or long-time policies. However, it should be recognized and remembered that a large majority of water works organizations now are operating under this form of government. Many excellent examples of successful operation under this form already exist and are models of efficiency and monuments to outstanding *personal* leadership. It will be very difficult to win a satisfied citizenry away from this form where it operates to their satisfaction.

5. *Small city and village one-man organization.* This is a simplified form of the mayor-and-council form, and reflects both the good and bad qualities. This form demands sound basic laws in the state (or province), with a strong supervisory body of the state (or province) to give the necessary general data essential for, but generally unavailable to, those in charge of these small utilities.

### Correcting Weaknesses

In considering the above forms nationally, there is an expression of confidence in the commission form of management independent of any regular municipal organization. However, the *practical fact* must not and cannot be neglected or ignored, that probably a large majority of water works systems operate, and in all likelihood will continue to operate, under the mayor-and-council and one-man-organization

forms. Consequently, very serious studies must be made of the basic laws of the various states and provinces looking toward their improvement to advance the status of water works management possible and feasible under these allowable forms of municipal organization. This study will necessitate the examination of existing codes or the enactment of enabling legislation to gain the results desired without too drastic revision of the existing and publicly approved fundamental form of management.

A comprehensive study of the practicable alternatives in municipal water works management and organization setups, and the development of types of water works administrative controls which, with variations, could be adapted to practically all conditions, is a most comprehensive and constructive undertaking. With such a study available prepared under the prestige of the A.W.W.A., its findings would be helpful and instrumental in improving water works management in many communities. This would materially assist in improving the status of water works employees and in overcoming many of the ills directly and indirectly attributable to the general heading of management.

We should strive continually to analyze the causes that produce weaknesses in management and then take steps to correct them by well-recognized but neglected means of forceful personal effort, backed (as it will be) by an active and aroused citizenry.

Let us pause here and consider carefully what our answer would be to this pointed question: "What is it the average citizen wants and expects from a water supply system?" This inquiry calls for a rather searching and pen-

sonal form of introspection often not pleasing to contemplate. However, it must be faced courageously and frankly.

The average citizen wants an adequate, pure, sparkling, potable water, at a pressure and in quantity suitable for domestic and industrial needs and, in co-operation with the fire department, sufficient for fire protection. Again, all classes of consumers demand that these functions be provided efficiently and economically, that expansions be made as deemed necessary, and that the rates be reasonable and in step with other items of the cost of living.

### Public Confidence

In general (except in the large number of initial municipal installations) municipal ownership grows out of the failure of dissatisfied citizens to get what they want from some water company. The aroused people vote for the purchase of the private plant, establish a form of management by legal statute and vote funds for the desired improvements. As the result we find a city embarked upon municipal ownership of its water supply system as a proprietary function.

Let us examine the urge that brought about this change. It is not fundamental that this function should be governmentally operated, as witness the Indianapolis and numerous smaller private systems operated very successfully by various so-called holding companies. They have acquired and hold the public confidence.

Generally, municipal ownership may well be considered to have been the result of the inability or disinclination of a particular water company to meet the demands or to make the investments deemed necessary by the citi-

zens for desired improvements or expansion of the system. The public will get what it wants when aroused to the point of action.

Having acquired the water supply system, too little thought may be given to its management and operation. Often so-called "basic laws" are discovered to be vague and broad, permitting wide variation in local control. The newly-organized management is subjected to numerous pressure groups working at cross-purposes insofar as water works management is concerned. Too often those who were instrumental in acquiring the water supply system fail to continue to give their *active* support to the newly-organized management.

### Allocation of Funds

The water utility becomes a self-supporting, going organization, and, being proprietary, obtains its income from, shall we say, the left-hand pocket of the citizens, while other governmental functions derive their funds from the right-hand pocket. The ordinary right-handed man finds it more difficult to withdraw things from his left pocket, hence is very conscious of the demands upon it. The right-hand pocket, however, "gives" with only slight difficulty, consequently the political subdivision ordinarily uses the right-hand pocket. If it attempts to use funds in the left pocket, it finds very quickly that the water works man is jealous of these funds and believes that they should be used only for particular water needs.

Call it what you will—surplus, reserve, depreciation fund or cash balance, any efficiently managed utility with a reasonable rate schedule will end each year with varying amounts of cold cash. It is here that sides are taken. What shall be done with it and

who shall do it? Shall it be used for plant extensions, held for reserve to replace worn-out plant, used to permit reduction of rates, or transferred to the general expenses of the city?

The arguments pro and con are familiar to us all. Fundamentally, utility management says that it should have absolute control in the case. "Transfer to the general fund" are fighting words to the water works man, and they constitute the major argument for separate management of water works utilities.

### Use of Surplus

It is here that water works management quarrels with its friends in the municipal administration over the use of the surplus or reserve derived from the left-hand pocket, i.e., water works funds. It is often heard said: "Since the citizen pays in any event, what is the difference where it comes from?" On the other hand, a moment's inspection will disclose the really great difference between the taxpayer and the water consumer, both in payment made and in service received. The water works profession generally deems it essential that top management of the utility shall have freedom as to policy, freedom to establish rate structures, freedom in control of funds for expansion, freedom in control of personnel, freedom in matter of purchase of materials and entering into contracts, and freedom in long-term planning and development.

In addition to these freedoms, a municipally-owned water works generally receives the city's credit in financing; is generally free from taxation; accepts legal and financial advice; participates in bulk buying by the city's purchasing department; and receives the protection of the fire and police departments.

The generally accepted credit given in return to the city at large by the water department is in the realm of "free water" and facilities for fire protection.

To attain the above-mentioned freedoms and services, there has been a tendency to establish boards, commissions and authorities to manage public utilities, said organizations being but loosely controlled by the general municipal administration. Is this a tendency to return to the principles of private ownership? Are these essential and inherent to proprietary functioning? We are often asked these questions. What shall be our answers?

No question is more troublesome than the following: "If the utility has a free hand in management, receives all the freedoms above-mentioned, including establishment of a rate schedule satisfactory both to the management and to the citizens, is it management's concern as to what is done with its excess earnings?"

### Confidence Is Needed

Not long ago I was asked quite pointedly: "Are we as water works men looking at this problem of municipal utility management, and especially of financing, through too narrow and jealous an eye?" We can readily see that the implication is obvious. We are assuredly being told that we are not set apart but are definitely part of a business controlled by the people. We are obliged to admit further that the success of any plan of management depends not only on the merits of the plan itself but also upon the continued active support of those who believe in the plan. Many an excellent legal set-up for management has failed to produce the results anticipated due to the fact that those interested in fighting for and obtaining the desired plan

failed to give it their *continued* support and vigilance *after* its adoption.

Be it good or bad, the people get the kind of management they want and for which they will work. The citizenry forms a decidedly important element in the problem of management. While sound basic laws under which a municipal plant must operate are the first and foremost necessity for good water works management, it must be admitted that somehow or other poor management can and does exist under ideal basic laws. Most fortunately the reverse is likewise true. Too often we find efficient leadership and progressive personnel strangled and retarded by outside agencies, laws and forces beyond the control of the trained utility manager and his loyal organization.

Successful operation of a water works, sewerage system or other type of municipally-owned and operated utility requires that top management have the confidence of the community to an extent that it will be given freedom of action as to policy, control of personnel, purchase of materials and the entering into of contracts, control of utility funds and establishment of rates. Unfortunately existing basic laws do not always provide for such fundamentals.

We must admit that a uniform system of top management is not always possible or perhaps even desirable. Past history and local conditions always claim consideration, for it should be remembered that it is often hard to convince a given citizenry, fixed and satisfied with a bad old method, that it should forget the old and adopt a new (to them) and untried method, regardless of how good it may have

been proven elsewhere. Again it can be said that, in general, the public gets what it wants, good or bad. And let us remember that the manager is a public servant, which means he serves the public with its needs and requirements as they may be presented to him or demanded of him.

### Summary

In conclusion it may be said that the water works profession will do much to improve its own status if it can effect a better top management, commanding public confidence. Too often public opinion concludes that the water works manager is doing a routine job in handling daily occurrences; and that a plant, once started, grows and expands under its own momentum. This illusion must give way to a true understanding of the facts, which dictate that good management will result only when *continuing* policies are allowed to develop and to thrive under merited public approval.

The results of such policies definitely are adequate facilities, good operation, practical maintenance, logical replacement and expansion, sound fiscal methods, satisfying public service, reasonable provision for the future, and all-round efficient administration.

Present and future needs and problems must be conducive of and met by careful, economic, sound planning both in design and in financing. In other words, sound management merits public confidence because it cares for the needs of the present and protects and insures the hopes of the future—a truly honorable undertaking, worthy of the water works profession and a challenge to all so engaged.





## Utility Administration in Canada

*By A. E. Berry*

**T**HE great majority of public water works systems administered by public utility commissions in Canada are found in the province of Ontario. Other provinces, however, have legislation on utilities, and some supervision is given by the province over these. Since the procedures followed in the provinces of Ontario and Nova Scotia are described elsewhere in this issue, this discussion is confined to the remaining provinces of the Dominion.

There is a considerable similarity in the legislation and in the procedures followed in the different provinces, except Ontario. All have provincial utility commissions or other bodies appointed for the supervision of public utilities. All are given authority to adjust rates and to supervise utility administration generally.

### British Columbia

In British Columbia the Public Utilities Act of 1938 is in force, along with certain amendments made in the interval. Under this legislation a public utilities commission has been set up for the province, consisting of three members. This commission has the general

supervision of all public utilities, including devices, extension of works, rates charged, and other matters.

A "public utility" means any person who owns or operates facilities for transportation, toll bridges, telephones, telegraphs, gas, electricity, steam, water, etc. This does not include, however, a municipality which furnishes such services within its own boundaries. Thus, water works systems would not be included, unless operated by a company or private party, or furnishing water to areas outside. The Greater Vancouver Water District is specifically excluded.

The annual reports of the commission indicate that a number of private water works systems are under control of this body, as well as a good number of publicly-owned systems supplying water to areas outside their own corporation limits.

The commission is given wide authority to act on complaints or on requests of interested parties. It may also act on its own initiative, and enforce its decisions respecting rates, service rendered, etc. All rate schedules must be filed with the commission and cannot be changed without its consent.

The commission has set a tariff of fees for applications to perform certain functions under the act. In 1944 the income of the commission was \$175,945, which resulted in a net revenue

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A paper presented on April 20, 1944, at the Canadian Section Meeting, Niagara Falls, Ont., Canada, by Dr. A. E. Berry, Director, San. Eng. Div., Ontario Dept. of Health, Toronto, Ont., Canada.

nue over expenses of \$64,507. A substantial number of the applications to the commission appear to deal with the fixing of rates and for requiring utilities to extend services.

### Alberta

In Alberta the situation is somewhat similar to that in British Columbia. The Public Utilities Act has been in force for a number of years, and a Board of Public Utility Commissioners has been in existence since 1914. The board is primarily concerned with the fixing of fair rates for utility services.

While it has authority over water works in the same manner as the commission in British Columbia, nearly all water works are operated by the municipalities and hence are outside the jurisdiction of the board. Where water supplies are subject to this control, they have not been involved in disputes, and the board has never been called upon to exercise any administrative powers over a water utility.

In addition to supervision over the usual utilities, the board has authority to deal with milk supplies. All these utilities include those owned by the municipalities and by the government.

### Saskatchewan

In Saskatchewan, there is a Local Government Board appointed by the province, which appears to have powers somewhat comparable to the powers of the Ontario Municipal Board.

The Public Utilities Companies Act applies to water, gas and electric companies. Water utilities, including all municipal systems, come under control of the board. It consists of three members, and has authority to review and fix rates, as well as general supervisory powers.

### Manitoba

The legislation in Manitoba is the Municipal and Public Utility Board Act. This covers transportation, telegraph, telephone, water, gas, heat, light and power, whether owned by a municipality or by the government.

A Municipal and Public Utility Board of three members is appointed by the government, and given somewhat similar authority to those of other provinces. It can settle disputes, may order extension of services, may investigate on its own initiative, and may fix rates. All changes in rates are subject to approval of the board.

### Quebec

In the province of Quebec, the statutes have provided for a Public Service Board of five members, appointed by the government. The purpose of the board is for arbitration, supervision, and control of public services and public utilities.

Public service includes telephone, telegraph, transportation, gas, steam, heat, electricity, water works and sewer systems. Where a municipality is operating its own water works system, it is not included except for that part which may be operated outside the corporation limits.

The board has extensive authority and can, upon its own initiative or at the request of any interested party, amend the rates and rentals charged for the service, or require measures for improvement of the service.

The board has the right to pass regulations and can set fees for application of any matters placed before it.

### New Brunswick

A Public Utilities Act is in force in New Brunswick, and a Board of Com-

missioners of Public Utilities is provided for in the act.

Here a public utility includes transportation, telephone, heat, light, power, gas or water, and the act is applicable also to a municipally-owned utility giving service to an area outside its own boundaries.

The board is composed of three members, each being appointed for a period of ten years. The board has general supervision of all public utilities, and upon complaint may investigate and enforce its decision on rates and general operation of the utility.

The expenses of the board, including salaries and travelling, are paid for by the several public utilities, and the

amount charged to each is assessed according to its gross earnings.

The schedule of rates of all utilities must be filed with the board, and no changes can be made until the proposed rates have been approved.

### Summary

From this survey it will be seen that while in all provinces there is legislation available respecting public utilities, it is only in the province of Ontario that administrative control of municipal utilities has to any extent been placed under public utility commissions. In spite of this, the supervisory authority over utilities is greater in the other provinces than in Ontario.

Any water department that can use a supply of reprints of the paper *Watering Lawns* published in the March, 1944, issue of the Journal (pp. 330-333), should address inquiries or communications to the American Water Works Association, 500 Fifth Avenue, New York (18) New York.



## Utility Problems in Nova Scotia

*By Ira P. Macnab*

THE term "public utility" has no generally accepted definition. In Nova Scotia public utilities are those enterprises specified in the Public Utilities Act. As a definition, the author suggests that a public utility is a public or private enterprise supplying to a community a service necessary or desirable for the public welfare and of such a nature that operation as a monopoly under public regulations will give the best and cheapest service, at the same time permitting a reasonable return on the capital prudently invested.

There are four points in this definition which embody the main principles of public utility operation:

1. The service is necessary and desirable for the public welfare.
2. The service must be safe and adequate at just and reasonable rates.
3. The service is rendered as a monopoly.
4. The service must yield a fair return on the capital prudently invested in the property used and useful in supplying its customers.

These four principles embody practically all the problems which public

utility operators have to meet. Whether the enterprise is publicly or privately owned does not make any significant difference.

### Regulatory Enactments

Control and regulation of public utilities in Nova Scotia began in 1909, when on April 23 "An Act to Establish a Board of Public Utility Commissioners" was passed by the legislature of the province.

This act defined a public utility "to mean and include every corporation, company, person, association of persons, their lessees, trustees, liquidators or receivers appointed by any court, that now or hereafter owns or may own, operate, manage or control any plant or equipment for the conveyance of telephone messages or for the production, transmission, delivery or furnishing of heat, water or power, either directly or indirectly to or for the public, and also means and includes any city or incorporated town that now or hereafter owns or may own, operate, manage or control any plant or equipment for the production, transmission, delivery or furnishing of heat, water or power, either directly or indirectly to or for any other city or incorporated town."

Under this definition, publicly-owned systems, except where they were sup-

A paper presented on April 20, 1944, at the Canadian Section Meeting, Niagara Falls, Ont., Canada, by Ira P. Macnab, Commissioner, Board of Commissioners of Public Utilities for Nova Scotia, Halifax, N.S.

plying outside municipalities, were not included. The important provisions of this act were:

1. Every public utility was to furnish reasonably safe and adequate service and facilities.

2. The rates to be charged for any service furnished by any public utility were to be reasonable and just.

3. All public utilities were required to file with the board, schedules showing the rates, tolls and charges which were established and in force at the time of the passing of the act.

4. After such schedules were filed, no changes were to be made in schedules without investigation and approval by the board.

5. The board was empowered to make any inquiry regarding the affairs of any public utility on any matters pertaining to such public utility pending before the board.

6. The annual expenses of the board were to be provided by the payment of a \$25 fee by publicly-owned electric systems, the balance to be assessed against privately-owned utilities in proportion to their gross earnings. Municipally-owned water systems did not contribute.

During the years following 1909 and up to 1912, the board prepared and issued regulations as to procedure of accounting for electrical, gas, tramways and telephone utilities. These regulations generally followed the uniform system of accounting as prescribed by the National Electric Light Association and other such bodies. No contentious matters were dealt with, but a number of utilities voluntarily reduced their rates.

### Widened Powers

In 1913 the act of 1909 and amendments were consolidated and widened:

1. Bringing under the jurisdiction of the board all municipally-owned utilities supplying service to the general public or to other municipalities.

2. Providing against discrimination in rates.

3. Making it necessary, in the public interest, for one public utility to permit the use of its poles and other facilities by any other public utility, under such conditions as the board found to be just and reasonable and at such compensation as fixed by the board.

4. Giving the board authority to employ experts to determine the extent, condition and value of any public utility. In other words, to make valuations. The exact wording of the law as passed at that time is: "The Board may at any time, with the assistance of such expert engineers, accountants and valuers and others as it deems wise to employ, inquire into the extent, condition and value of the physical assets of any public utility, *or into the condition and value of the undertaking as a going concern*; make such rules and regulations to facilitate inquiry to be made under this section as it may deem convenient, and the rules and regulations so made shall be binding on all public utilities." The phrase "the condition and value of the undertaking as a going concern" has given rise to much controversy, of which more will be said later.

5. Requiring every public utility to carry a proper and adequate depreciation account if the board found that such depreciation account was reasonably required; and the board was charged with the duty of determining such rates of depreciation as would provide the amount required over and above the expense of maintenance to keep such property in a state of efficiency corresponding to the progress of



the industry, such amounts as charged for depreciation to be allowed as an operating expense. It also provided that the monies in the depreciation fund were to be expended in new construction, extensions or additions to property, or invested. If invested, the income from the investment was to be carried in the depreciation fund. This provision, it will be noted, is a combination of ideas including both regular depreciation and sinking fund principles. On the theory that the depreciation reserve is a measure of the value of property used up in serving the consumer, the money belongs to the utility and the interest earned by it belongs to the utility, and should not be added to the reserve.

6. Requiring notice to the board, and consent in writing by the board after due inquiry has been made, before any public utility was permitted to abandon any part of its lines or works after same were in operation.

7. Declaring that no public utility could issue any shares, stocks, bonds or debentures, or any evidence of indebtedness payable more than one year from the date of issue, until authority from the board was obtained for such proposed issue. This did not apply to municipally-owned utilities.

8. Empowering the board to make rules and regulations with regard to its procedure, to compel attendance before it of witnesses by subpoena, and to take evidence under oath. It was provided that any order made by the board could be made a rule or order of the Supreme Court of Nova Scotia, and enforced in like manner.

9. Providing for an appeal to the Supreme Court from any final decision of the board on any question of law. Only twice during the 35 years the board has been operating has applica-

tion for leave to appeal been made. The first time the presiding judge refused the application, and the second case was dismissed by the court.

### Regulating Competition

An amendment to the act in 1918 provided that no public utility was permitted to begin construction of any line, plant or system in any territory already served by a utility of like character without first having obtained from the board a certificate that the present or future public convenience and necessity required such construction; and further that no public utility was permitted to make any extension to or changes in its line, plant or system which could be detrimental to the service supplied by any other public utility.

The purpose of this was to eliminate the possibility of unfair competition as between public utilities which might, in the long run, tend to affect the interest of the public or, in the case of rural electrification, interfere with telephone service in rural areas.

In 1921 the act was amended to provide for the rate of return that public utilities were allowed to earn. The amendment reads, in part: "A public utility, after making all just allowance according to the rules and regulations of the Board of Commissioners of Public Utilities, shall be entitled to earn an amount equal to *at least* 8 per cent of the fair value of its property, assets and undertaking." This was further amended in 1923 by eliminating the words "at least" and fixing the amount of return at 8 per cent after providing for operating expenses, *taxes of all kinds* and all just allowances made according to the rules and regulations of the board.

The foregoing is a brief history of

the principle features of public utilities legislation within the province until the year 1943, when the act was completely redrafted and very material changes made.

### The Board's Work

The board is a quasi-judicial body. The decisions of the board are not subject to government approval but only, as already pointed out, to appeal to the Supreme Court on questions of law. The act permits the appointment of four members, but there have never been more than three. As presently constituted, the board consists of two lawyers and an engineer. The work of the board comes almost completely within the confines of those two professions.

In addition to regulating and controlling public utilities, the board also administers the Rural Telephone Act, the Gasoline Licensing Act and the Motor Carrier Act. At the last session of the legislature the board was given jurisdiction over the sale of milk and milk products, which are not treated as public utilities.

During the years since 1913 the board has dealt with many cases, particularly in connection with telephone and electric utilities. A brief review of some of these cases will serve to indicate the problems met in the past and the method of dealing with them, as well as the trend of thinking through the intervening years.

The first case of importance was a valuation of the Maritime Telegraph & Telephone Co., Ltd., in 1914. This company serves the whole province with the exception of local rural areas served by mutual companies operating under the Rural Telephone Act. It also connects with the New Brunswick Telephone Co., and with Prince Ed-

ward Island by cable. The company engaged experts to make the valuation, which was prepared as follows:

1. Estimated reproduction cost of actual physical property, including a percentage for omissions in inventory, less depreciation.
2. Overhead costs to cover engineering, supervision, legal expenses, interest during construction, etc.
3. Working capital, including allowance for materials and supplies.
4. Going-concern value.

### Basis for Depreciation

The experts engaged determined the accrued depreciation on the basis of inspection. That is to say, if an examination revealed no appreciable loss through use, no accrued depreciation was set up. With this the board of that day did not agree, and while it is not set out in so many words, did in fact, find for straight-line depreciation.

With regard to going-concern value, it is sufficient now to say that the board of that date did find an amount for going-concern value. The amount as found by the company's experts was \$610,807, while the amount fixed by the board was \$300,000, but no rule or formula for the determination of this nebulous value was set forth. For many years the board continued to find going-concern value as an item in valuations of utility properties, but in recent years there has been a change in this regard.

Based on the value found, the board in 1919 issued a further decision with regard to this company's operations. Service or exchange areas were established and classified, service facilities which each such area was entitled to were set up, operating costs to furnish such facilities were determined, and rates were approved that would return

to the company sufficient revenue to pay these costs, provide for depreciation and allow a return of 8 per cent of the value of the plant.

At that time rates of depreciation of property were fixed which it was later found were higher than were required to maintain the capital of the company intact, and in 1928 a further study was made which resulted in the fixing of rates of depreciation by classes of property rather than a composite rate. At that time, by order of the board the company was required to report to the board at five-year intervals, when the rate of each class of property was reviewed from the experience of the previous years. By this procedure the service life of the various classes of telephone property in the province will eventually be established, and mortality curves representing actual service life will be available. This, in the author's opinion, is the only way that the vexed question of depreciation can be intelligently dealt with. It is working out satisfactorily, and the operations of the company have shown a steady, healthy growth. The company has been able to attract new capital, and a reasonable return on the capital invested has been maintained.

Another important proceeding by the board was the valuation of the Nova Scotia Tramways & Power Co., Ltd., now the Nova Scotia Light & Power Co., Ltd., which is the company serving the city of Halifax and district. This company owns and operates the light and power, tramways and gas services. The proceeding was instituted by the board on its motion, and a firm of consulting engineers was engaged by the board to compile the inventory and valuation. On the instructions of the board this inventory and valuation was made as follows:

1. On the basis of costs of materials and labor prevailing on October 1, 1921. (In other words, reproduction cost, as this was the date of the valuation.)

2. On the basis of the average prices of materials and labor during the twelve years preceding October 1, 1921.

3. On the basis of original cost; that is, actual cost of the property in service.

### Definition of Value

In the decision fixing the value in that case, the board defined "value" as follows:

"The term 'value' as we use it in this decision means the number of dollars found to be fairly represented in the service concern of the utility upon which the utility is entitled to earn. Finding this number of dollars is the 'valuation' of the service concern, and the amount, when found, constitutes the rate base as of the valuation date.

"The service concern comprises all the elements used and reasonably required for the rendition of service, including as much excess capacity above immediate use as may fairly be required for the protection of the present service and for meeting developing demands. Among these elements may be suggested the physical property, such as lands, power houses, machinery and devices for generating and controlling electricity, safety and measuring devices, pole lines to substations and to the place of use and labor, superintendence, engineering, legal and other services necessary. There are also the corporate and operating organization and records and experience; money with which to bridge the gap in time between rendering the service and getting the pay for it; and materials and supplies necessary for the operation of the business.

"Before these could be a service concern, all of the elements had to be planned, acquired, built, connected and balanced; it was necessary to secure customers, establish a market and set the thing going as a serving concern. Each of these steps represents dollars of necessary investment and it is the purpose of the valuation to study out how many of these dollars the service concern

fairly represents, comprising, as it does, all of these elements."

It is interesting, the change in thinking which occurred between the time of the telephone company valuation in 1914, when value was determined only on the basis of reproduction cost, and this proceeding, where the board considered the three bases of fixing the same elements of value; namely, value of physical property, depreciation, engineering supervision, working capital and going-concern value.

### Depreciation

In this case a great variety of views were expressed on depreciation, but the board of that time defined depreciation as follows:

"Depreciation is the act or state of lessening worth, and in connection with such valuation as this includes all forms of deterioration in value, not only due to age (decrepitude) but to obsolescence, inadequacy, wear and tear and overdue repairs and renewals, otherwise termed deferred maintenance."

The definition which we now think includes the elements which should be included in the determination of depreciation is:

"Depreciation is the exhaustion of service life or capacity caused by the various forces acting to terminate or limit that service life or capacity, not restored by current maintenance. The factors which limit service life or capacity are physical wear and tear, decay or corrosion caused by action of the elements, inadequacy, obsolescence, and the demands of public authority."

Again the board did not state the method they had used in determining the amount of accrued depreciation, but the decision indicates clearly that it was determined on the theoretical straight-line basis.

As previously stated, this valuation covered light and power, tramways and gas operation, and it was at this time ruled that each was a separate utility and must stand on its own feet; that is to say, that the customers of one kind of service should not be required to pay rates to make up a deficiency in the earnings in either of the other classes, although the three utilities were owned and operated by the same corporate entity. This ruling was more or less continually questioned through the years, but has now been finally settled by legislation.

Another interesting problem which the board had had to meet is in connection with public convenience and necessity by one utility wishing to invade the territory of another. One particular case presented was as follows:

A private public utility was supplying electric service in four adjoining towns. This company was supplying a service under a franchise granted to it; but due to the nature of its plant, its rates were not attractive. The towns in question, together with the surrounding territory, incorporated a commission for the distribution and sale of electric energy within the territory. In the act of incorporation the legislature directed that the corporation so formed should be subject to the Public Utilities Act. Application was made to the board for a certificate of convenience and necessity to invade the territory already served by the existing private corporation.

After investigation the board found that the existing company had the financial ability to serve the territory; that with the conditions under which they were operating they were serving at prices which were not unjust or un-

reasonable to allow them a reasonable return on the capital invested; and that if the certificate were granted, without doubt they would be driven into bankruptcy. It also appeared that the applicant commission had the necessary financial ability, as their act of incorporation had empowered them to issue bonds, on the credit of the four towns and the surrounding municipality, which would give sufficient capital to go ahead with their project; and that if the certificate were not granted, the consumers in the territory would be deprived of the opportunity of getting the benefits of the new service, which would be at a much lower cost than the existing service.

The board did not grant the certificate, but arrangements were made whereby the provincial legislature required the new corporation to pay to the existing utility a reasonable price for its plant.

Before leaving this part of the paper, it should be pointed out that in more recent years the trend in valuation proceedings has been definitely towards the prudent investment theory, with the determination of accrued depreciation based on the straight-line theory.

### Going-Concern Value

The matter of going-concern value has been one of much consideration, and our thinking on this question has developed to the point where we are satisfied that at the beginning of the period of regulation there was an item of going-concern value because of the fact that companies had built up an element of value in developing their service, in many cases in the face of competition which had not been capitalized, but through monopolistic control no additional value is likely to be added

to this item. Therefore, so far as valuation for rate-making is concerned, going-concern value as originally found in earlier valuations should be considered a reasonable item of value until amortized or otherwise written out, but no speculative amount may be added because of increase in business or any other element unless the actual record of the expenditure in regard thereto can be proved. There may, however, be an element of going-concern value when fixing value for sale.

### Rate of Return

Another element in which we have changed our thinking is in the rate of return. Whereas, as previously pointed out, the utilities in Nova Scotia were permitted to earn a return of 8 per cent on their rate base—that is, value less accrued depreciation—we now believe that the rate of return should not be a fixed amount but should be a reasonable return based on the cost of money and any other elements which may be found to enter into any particular case.

In 1943 the legislature of Nova Scotia finalized these trends of thought by Chapter 2 of the Acts of 1943; and today our Public Utilities Act provides:

1. "Where any public utility furnishes, renders or supplies more than one type or kind of service, the board shall segregate such type or kinds of service in the distinct class or category of service and for the purpose of determining the rate base for a particular service furnished, rendered or supplied, and for the purpose of annual and other returns each distinct class or category of service shall be considered as a separate and self-contained unit, the rate base for which shall be determined and fixed without regard to the rate base determined and fixed for any other unit."

2. "The board shall determine the value of such property and assets (of any public



utility) on the basis of the prudent original cost thereof, deducting therefrom the amount of the accrued depreciation of such property and assets as determined by the board.

3. "Annual and accrued depreciation shall be calculated by the straight-line method, so-called, or such other method as the board may from time to time prescribe.

4. "The board may direct that a public utility shall make such provision as to the board seems proper for the amortization of the sums allowed in the rate base for organization expenses and expenses of valuation, and may direct that the sums required annually for such amortization shall be charged as an operating expense.

5. "Every public utility shall be entitled to earn annually such return as the board deems just and reasonable on the rate base as fixed and determined by the board for each type or kind of service furnished, rendered or supplied by such public utility."

### Fair Return Equitable

As a public utility is an organization to render a public service necessary or desirable, it is fair and just that it should be permitted to earn only on what capital is prudently and reasonably invested in it, and that the rate of return on such investment should be sufficient to pay its capital charges on a reasonable proportion of bonding, where such is the method of financing, and a fair return on the equity stocks if it is a corporate entity having such a class of securities. It should also be permitted to recoup from the users of the service the value of the property used up in rendering that service, namely, adequate depreciation; and the rates paid by the consumers should be non-discriminatory and should not be higher than will make provision for the above. Any utility with monopolistic privileges operating under the above conditions will, in my experience, have no difficulty in obtaining all the capital needed to make necessary extensions to its plant and system.

### Water Utilities

So far, the question of water utilities as such has not been discussed, although it will be recalled from the definition of a public utility that water, whether municipally or privately owned, supplying water directly or indirectly to or for the public, is a utility within the meaning of the act.

There are only two privately-owned water utilities in the province, and only one of them is of any size, therefore the problem of water supply is with publicly-owned ventures.

During the earlier years of regulation very little was done with regard to the control of the municipal water systems. Generally, operation was left to the councils of the various municipalities. In more recent years, however, it has been necessary to assume greater control over these projects. Upon investigation it was found that the operation of these utilities was completely mixed up with the operation of the municipalities; no proper capital set-up was kept; no distinction was made in the bond issue of the municipalities, towns or cities, as between water and municipal affairs; and no proper check was kept on the operating costs. In most cases rates were based on expediency rather than on the cost of the service. Rates generally were based on the number of fixtures installed rather than the amount of use, although in some cases they were based on the assessment of property. Although a large amount of the expenses of any system is due to the necessity of providing fire protection, no charge was made for such protection.

We have now had the opportunity of making a complete investigation of a number of these water systems, and believe:

1. That a uniform classification of accounts for water utilities should be set up.

2. That the operation of water systems as well as other public utilities should be divorced from municipal operations and put under independent commission operation either as owning and operating commission or at least as operating commission, so that the operations will be completely divorced from the municipal affairs.

3. That water should be sold by meter like any other commodity.

4. That instead of financing by sinking-fund bonds guaranteed by the municipality owning the same, any water system, being a service project, should be financed in such a manner that the consumer is paying only his proportionate amount of the use of the plant from which he is taking service.

5. When operated in this manner, a municipality becomes a shareholder, and any surplus earned after paying for operating costs and providing for depreciation and proper capital charges, should be turned over to the municipality as dividends to the shareholders.

One of the most common practices found is that of supplying free water service for sewers and street flushing and for public buildings, parks, etc. In the author's opinion this is wrong in principle. These services are for all the people and consequently should be paid by all and not by the water users only.

Another practice which we found to be prevalent was the granting of free water to attract industries. This also is wrong in principle. If it is desirable to attract an industry which needs bonusing, in the long run it will be better that the necessary bonus be paid from the general revenue of the mu-

nicipality where the industry is to be located rather than by the gift of utility services which must, in the end, be paid for by the users of that service and not by the citizens at large.

To quote an extreme case which came before us a few years back:

A small town in the province found itself in the position that its consumers on the higher levels were completely without water during certain periods of the year. The council decided to spend \$35,000 to lay an additional main so that water would be available to all. They eventually made application to the Department of Municipal Affairs for authority to issue bonds for this amount. At that time we did not have any control of the expenditures for municipally-owned utilities. The department, however, referred the matter to our board for an opinion as to the necessity of making this expenditure. After investigation we decided that the per capita consumption of water within the town was very high, and that if it could be reduced to a normal amount the existing system had sufficient capacity to supply the need. We recommended that meters be installed, and after a very heated argument this was done at an expenditure of slightly less than \$9,000, as against the proposed \$35,000. The first result which we found was, as we expected, that consumption was reduced to such an extent that the existing system supplied ample water, and in spite of the fact that a very large training station is now situated near the town, resulting in a great influx of population, the old system is still supplying ample water. The next result was that the two firms in the town were using 48 per cent of all the water being supplied—"using" advisedly, be-

cause after metering their consumption was more than cut in half—whereas their combined contribution to the revenue of the town for water service was \$180 per year out of a total revenue of \$6,800.

Generally speaking, in designing a system of water rates it should be divided into three parts:

1. That charged against the public and raised by general taxation, such as street and sewer flushing and water for public buildings, etc.

2. That to be assessed against real property for fire protection.

3. That to be raised by the charges to the individual consumers, whether domestic or industrial.

This is a very rough sketch of some of the problems we have faced over the last 30 years. An attempt has been made to present these problems in such a way as will promote discussion, since only by discussion can we arrive at a proper understanding.

### RATES OF FLOW FROM LEAKY FAUCETS

The statement on leaking faucets which appeared in the March Journal has brought some interesting responses. A letter from Lyman M. Van der Pyl, Chief Chemist, Pittsburgh Equitable Meter Company, advises that the actual leakage of a faucet varies with the rate of dripping. Some years ago his Company checked about a dozen faucets at varying rates of flow with the following results:

<i>Drops Per Min.</i>	<i>Gals. Per Mo.</i>	<i>Drops Per Min.</i>	<i>Gals. Per Mo.</i>
10	15	110	182
20	30	120	201
30	46	130	220
40	62	140	240
50	78	150	260
60	94	160	281
70	111	170	302
80	128	180	323
90	145	190	345
100	163	200	367

The size of the drop increased with the rate of dropping. Different faucets gave drops of varying size, but gener-

ally within 5 per cent of the Table. Drops from faucets of identical design were not the same. While the Table is not exact, it does indicate how dripping faucets vary.

It is Mr. Van der Pyl's opinion, not checked by actual tests, that the factor of 0.6 which was applied to Freeman's tables may not be correct; that the factor of 0.6 applies to a sharp-edged orifice, generally not the type of leakages in faucets. The average faucet, in his opinion, has more the form of a nozzle or venturi tube, in which case the coefficient would be 0.9 or higher. In an extreme case where the discharge would approximate that through a porous medium, the factor would be unity.

All of this adds up to the propriety of some of the water maintenance shops doing some experimental study of the loss of water through dripping faucets where the pressure and flow conditions are definitely recorded.



## Utility Administration in Ontario

By O. H. Scott

**W**ATER utilities are primarily designed for producing adequate supplies of pure, wholesome water for domestic, commercial and industrial purposes. As water is also the best extinguishing agent for general fire-fighting operations, there is need of it in reasonable quantities for fire-protection purposes.

In the earlier stages of water utility development, private capital was to the fore; but as the necessity for the development of the service became evident, the public realized it was a monopoly which should be operated by and for the users, and many of the privately-owned plants passed to the municipalities. In Ontario this was made possible by legislation under the municipal and public utilities acts.

The Public Utilities Act provides for placing the utility administration in the hands of either the council or a commission. In each case the administering body is a corporate entity and acts for the people who are the corporation. It might be noted that many, in reading the act, assume that the council of the municipality is the corporation, whereas the people are the corporation.

The Municipal Act covers the necessary qualifications of the administra-

tors and matters pertaining to financing. In some municipalities the utility is administered by a board which operates under a special act of the legislature. The special act sets forth the regulations governing the operations of the board. Whether a council or a commission is the administrative body, the same fundamentals apply, and the duty of each will be to provide the water to the consumers at a reasonable cost. It is believed that it was not the intention originally that the water utility should be operated so as to provide funds for other municipal purposes, although in some municipalities it has occurred.

It should be noted that the council has authority to raise money, which the commission has not. It is understood that the act was so worded, not for the purpose of putting a limitation on the commission, but simply to prevent a duplication of the machinery for raising the necessary funds. The administrative body has been given wide powers by the Public Utilities Act. It can expropriate land, waters and water privileges. It can divert any lake, river, pond, spring or stream of water within or without the municipality. It can purchase any privately-owned water works.

### Fixing Rates

Full authority for fixing retail rates is in the hands of the governing body;

A paper presented on April 20, 1944, at the Canadian Section Meeting, Niagara Falls, Ont., Canada, by O. H. Scott, Gen. Mgr., Belleville Public Utilities Commission, Belleville, Ont., Canada.

but where water is sold on a wholesale basis outside the municipality, the Ontario Municipal Board may be called in to pass on the rates. In establishing rates, reasonable calculations of costs on general principals should be made and the utility should stand on its own feet and reimburse the municipal council for any money paid by it on utility counts. The land and the property of the utility are specially charged with the repayment of any sum borrowed or debentures issued in respect to same, and the holders of such debentures have a preferential charge on such land and property for securing payment.

In many municipalities the owner of the property served was considered to be the user, and thus any unpaid accounts could be collected in the same manner as municipal taxes. Latterly, however, the actual user has been considered as responsible for water rates; and if he is a tenant, a suitable deposit can be demanded as a guarantee. If it is desired not to collect deposits, a guarantee signed by a property owner in the municipality will suffice.

To prevent the wasting of water where there is a flat rate, penalties are provided, but in spite of many inspections the per capita use is much greater in unmetered municipalities than in metered ones.

The utility carries the service pipe to the property line without charge to the customer. The customer provides all piping on his property at his own expense, and in most municipalities the utility provides the meter.

To provide for the extension of mains into new sections of a municipi-

pality where the revenue would be too small to justify it, a special rate may be levied against all property which will be benefited, whether or not the owners use water.

A well-administered utility will keep arrears to a minimum; but should it be necessary to force collection, the debt may be referred to the courts, but authority to shut off the water is also provided.

Systems of accounting and operating are not uniform in the province. Each utility is required to provide a separate set of books, and each year a statement of its affairs must be presented to the public, the same being audited by the auditors of the corporation. As time goes on, more uniformity is being achieved, due to the many questionnaires which are required to be answered by government agencies, and also due to the work of this Association. The day of playing a lone hand has passed, and the water utility should join the Association, contributing what information it can and on all occasions getting all it can out of it.

There has been considerable controversy in some municipalities as to the use of water works surplus funds, and at the meeting of the Canadian Section, A.W.W.A., last year, a session was devoted to a discussion of the question. It was decided to ask the executive to endeavor to have the act clarified. The executive acted and presented a brief to the government. The act has been amended, but no doubt the executive would be pleased to know whether the amendments meet with general approval.





## Planning for Postwar Construction

By Wm. N. Carey

IN talking to this group about plans for postwar construction the author is in about the same position as the clergyman who advocated righteousness before a conclave of church dignitaries. Such an audience, as well as this one, can be assumed to be highly in favor of the subject discussed before it, but from there on, the similarity, if any, between engineers and the clergy is purely coincidental. Where ideas involving public morals, welfare and recreation are being hatched and developed, the clergy always is to be found taking a prominent part, often leading the way.

Engineers, in general, devote their energies directly to earning a living and are content to allow the churchmen, the doctors, the lawyers and the politicians to initiate and develop matters of public interest.

There is little point in anyone advocating to engineers and construction men the necessity of planning for postwar construction. We are as strongly in favor of it as the clergy is of religion, but we do little publicly to give our convictions life and action. Mere passive believers create few plans, either to save souls or build bridges. We need vigorous and vocal converts to lead the way toward the actual plan-

ning we must not leave undone if we are to escape postwar economic hell-fire.

We already know our subject. Planning and building have been our life work. Heretofore, we have looked upon them as little more than our personal means of livelihood. Now, however, planning for postwar construction has become a matter of vital national importance. Among all our people, the engineers, the architects and the builders are best fitted to stimulate public interest in this work and to direct it in the way it should go.

For our task we have been anointed with the aromatic, holy oils of experience, as well as with its many swift kicks in the pants. We are evangelists, indeed, but we do not preach to the right people. In general, we confine the advocacy of our beliefs to cloistered gatherings of engineers and builders. We should instead preach to the Philistines and the heretics, to the city councils, local chambers of commerce, to newspaper editors, and to all others less informed than ourselves as to the service to the nation which we can perform.

### More Than Planning Needed

Perhaps a review of some of the high points of the gospel of planning now for postwar construction may be helpful to some of you who already toil in the vineyard, as well as to any

A paper presented on June 14, 1944, at the Milwaukee Conference by Col. Wm. N. Carey, Corps of Engineers, Ch. Engr., Federal Works Agency, Washington, D.C.

new convert who here resolves to don the cassock and really go to work in his own home town.

No informed person believes that we only need to plan for a huge construction program after the war in order to assure prosperity. It is much more complex than that. Among the many factors of importance are:

- (a) The equitable liquidation of war contracts.
- (b) Conversion of war plants to peacetime use.
- (c) New private construction.
- (d) A reservoir of needed public works.
- (e) Adaptation of war materials to the uses of peace.
- (f) Industrial and academic schooling for returned service men.
- (g) Readjustment of wartime population concentrations.
- (h) Creation of new and better foreign economic relations.
- (i) The development of an adequate and equitable tax structure.

All of these are factors in the creation of postwar jobs and each is related in some way to all the others. Intelligent overall planning must take all of them into consideration and work them out together.

These factors, successfully applied, doubtless would result in our reaching the general objective outlined in the Baruch-Hancock report, namely a renaissance of private business and industry. Our outlook would be bitter, indeed, if we could not look forward with confidence to a nation wherein there will be work for all, with adequate rewards for the inventive and the diligent, without throttling combinations in restraint of trade or huge cartels dominating the economic lives of all the peoples of the earth. We

have a right to hope for postwar business conditions based upon the same high principles of free enterprise and the pioneer spirit under which our forefathers built a vigorous and great nation. Given those conditions, private business will, without question, ultimately provide the jobs necessary to support a national income adequate for prosperity.

### **One Hundred Thirty Billion Dollar National Income Required**

National prosperity depends upon national income, which in turn depends upon jobs and production. Experience has shown that with an annual national income around ninety billion dollars, we had reasonably full employment and fair prosperity. That was true when our national debt was under forty billion. With a national debt in the neighborhood of three hundred billion after the war, we will require a greater annual income than ever before if we are to maintain our living standards and begin to bring the debt back to manageable proportions. Though economists by no means are in agreement, the author's observation is that majority opinion indicates that a national annual income of between one hundred thirty and one hundred forty billion will be necessary to guarantee a fully prosperous immediate postwar era.

Similar opinion indicates that postwar prosperity can be attained through the employment of from fifty-six to sixty million people. This means a substantial increase over the employed labor force of 1940. That was by no means a depression year, yet Matthew Woll, Chairman of the A.F. of L. Postwar Planning Committee, recently asserted before a senate committee that we had about nine million unemployed

workers in 1940. He expressed the fear that, if we hold to 1940 production standards for the immediate postwar period, there will be nineteen million unemployed. Of course, that is the fear of but one well-informed man who, perhaps, could be accused of bias. It does, however, support the view that if we are to enjoy after the war the standard of living for which we now fight, we must employ more people, produce, consume and sell more things than ever before in our history. The 1940 level of economic activity will not be good enough. It is estimated that the productivity of labor has increased by about 10 per cent in the last four years, which means that today we could produce the 1940 volume of goods and services with about four million fewer workers employed.

### Number of Postwar Jobs Required Is Indeterminate

Little thought is needed to show the impossibility of arriving now at a reliable estimate of the number of job openings needed to provide useful work for demobilized military personnel and discharged war workers. Too many indeterminates are involved. We can rather reliably estimate the size of the national income we shall require and the total number of workers needed to produce it, but the number of service men and war workers who will be jobless following the gradual or sudden dawn of peace, and the rate of their release from war service, is a completely indeterminate quantity at this time. While a few indeterminates ordinarily do not frustrate a competent designer, the unknown in this problem is of such controlling importance that it precludes even a good guess at its magnitude.

Our design for postwar employment

must keep flexibility as its outstanding characteristic. For we cannot simply sit and wait for time to give us the measure of these indeterminates before we act. The fact that we cannot reduce this problem of war-released jobs to known statistics makes our duty to solve it both more difficult and more urgent. Our fighting forces have a much tougher assignment. They cannot know where the next shell will land, or when. Their lives are just one indeterminate on the heels of another. They cannot postpone action by long discussion and debate. On the home front, we might well emulate their example.

Engineering reasoning dictates that we use the known elements of our problem—required national income and the total number of workers to produce it—as the basis for a program which will be elastic and resilient enough to meet these now indeterminate loads, whatever they may be and whenever they may be applied.

### Little Finished Planning Yet Accomplished

With all the talk during the past year on planning for postwar construction, it would be surprising if nothing in that line had been accomplished. A start on such a program has been made but it is only a start. There are glowing stories in the press and trade magazines citing magnificent progress in postwar planning. Few stand up under engineering inquiry. In general, they represent only ideas and lists of desirable construction—not engineers and architects actually working. The picture isn't all black, however.

A survey made by the Postwar Construction Committee of the American Society of Civil Engineers as of May 1, reveals that surveys have been

started or plans begun for postwar construction, public and private, estimated to cost about two billion dollars. Only a small fraction of that backlog is now ready for bids and much of it must carry over many years after the war ends. This start on planning is curiously localized, 84 per cent of it originating in twelve states. As to the part of the total which is private construction, there can be no assurance as to when it will be constructed after the plans are completed. Private construction always is extremely sensitive to the economic state of the nation. Private construction programs promptly wither and die at the slightest anticipation of hard times.

### Public Works the Stabilizing Factor

In normal times construction accounts for about ten per cent of our national income, and public construction for but a third of that. The whole national economy cannot be supported by the construction industry alone, and public construction alone cannot be expected to sustain for long the whole construction industry. The strategic value of a stored reserve of needed public works is far greater than can be measured by its dollar volume. Public works present the only large factor in our national income which lies outside the field of private business but which can be simply controlled directly toward keeping the whole economy in balance. Controlled public works can be the gyroscopic stabilizer on our industrial ship of state to help it take safely the rough seas of our postwar years.

### Communities Should Throw Off Inertia

In spite of almost unanimous agreement that all local subdivisions of gov-

ernment should be diligently at work now on working plans for public construction, the general inertia is most surprising. Local communities, by and large, seem to be waiting for some outside source to start their work for them. The possibility that the federal government will provide funds for local planning, and perhaps construction, is holding back action. Many communities now are able financially to pay for their own planning but, with or without reason, it is exceedingly doubtful if enough cities will, on their own initiative, plan a program of sufficient size to be a really important factor in the postwar readjustment. Local governments too often will not proceed unless they are given the incentive of some kind of federal assistance.

### Early Action Expected of Congress

Congress is showing signs of soon declaring itself on this question. Only a few days ago the House Roads Committee reported out a postwar public roads bill. No bill has emerged this session relating to federal aid, if any, for planning for general and municipal public works. No one yet knows how or when the postwar roads bill (H.R. 4915) will emerge from congress or how a local public works planning bill will fare when it does come before congress.

Some form of federal monetary assistance to awaken incentive for planning local public works and to provide for central control probably will be forthcoming. No registered rider of the Washington merry-go-round expects Congress to say now whether or not there shall be federal assistance for construction of local postwar works. That problem can be met when the end of the war is in sight and a better estimate can be made of the

weight of public works construction then required to help keep the national economy in balance.

### **Continued Apathy May Bring Another WPA**

There is always the possibility that Congress will not pass any legislation to provide monetary aid to local subdivisions of government for planning. Should that occur and should municipalities persist in their failure to complete, without federal aid, plans for the community facilities they badly need, we shall be just that much closer to another WPA-type program as a postwar eventuality.

Few will deny that the millions spent under the old WPA were better spent than if they had been used for outright doles. All will admit that mass unemployment is of national rather than local concern. The responsibility for alleviating enforced idleness and hunger quickly passes from the local communities to the nation. Congress met that emergency in the thirties with the WPA program. The precedent is set, the way is mapped. Should mass unemployment overtake us after the war, everyone knows that Congress must and will devise some kind of emergency relief.

### **Insure Against Unemployment**

If local government and business do not put into effect now the best possible insurance available against unemployment—the prompt production of completed plans for postwar construction—and if congress does nothing about it now, how can we avoid an emergency relief program later?

The rate of our progress, or rather our failure to progress, during the past year and more in placing that insurance in force, is asking for another

emergency relief program. Continued lassitude on the part of state and municipal governments will go far to assure it. If the majority of our citizens are willing to take the chance of meeting a possible conflagration without fire insurance coverage, then that is where we shall find ourselves on V day. It is doubtful if people will be willing to take such a hazardous chance if the facts—the probabilities and the possibilities—are convincingly explained to them. Engineers, architects and construction men can do that convincing if they will but take the time and expend the necessary effort.

### **Urban Express Highways A Cure For Slums**

The one-and-a-half-billion-dollar postwar roads bill opens new vistas in the highway field as it pertains to large cities. No comparable national recognition has occurred in the field of sanitary engineering, but we can always hope for and work for ultimate congressional realization that there is a national, rather than state, responsibility in correcting the existing pollution of interstate waters. Surely the water supply of the nation is as important as its roads. The sanitary engineer has a direct interest, however, in the postwar roads bill, as construction under it may require major readjustments of water distribution and sewage collection systems in certain urban areas.

We all know that the principal highway problem today is urban in character. It is becoming increasingly evident also that surface transportation in our larger cities is directly related to the fast-growing problem of blighted areas and slums. The author is convinced that the construction of express highways in any large city, if intelli-



gently applied, can be a powerful force in establishing desirable patterns for city development, ventilating and revivifying blighted and decadent areas.

Limited access, express highways in urban centers can be located to divide cities into neighborhoods. Such neighborhoods, rigidly zoned and functionally designed with adequate municipal utilities and a street pattern fitted to land use, would tend strongly toward permanence. The express-ways which would form the boundaries of these neighborhoods would be friendly bulwarks protecting them from blight encroachment.

If the present trend of haphazard expansion is not stopped, many cities will be in serious financial difficulties, if not bankrupt, within the next few decades. Our cities must be stabilized, rather than expanded, made better functionally instead of merely bigger.

Urban express highways can contribute materially toward the evolution of the modern city and its satellite communities, toward the essential change from an amorphous conglomerate into an integrated organism planned for convenient and healthful working and living; for stability and permanence. Planning of a high order, and positive action by both government and industry, are obviously needed to reach that objective—to stop the cancerous growth of urban blight and slums and by major surgery to remove those growths where they now exist.

### **Public Works Program Must Be Flexible**

For maximum usefulness our post-war public works program must be flexible. The flexibility possible in such a program and its ease of central control make this the ideal force to

absorb the early, small spirals of unemployment wherever they may form. If we are ready to check these early isolated spirals as and where they form, we will prevent their growing and joining into a single, spinning economic cyclone. Like the stitch in time, it is the job in time which saves nine. These economic spirals always have small beginnings. They grow and swell as readily upward as downward, and the important thing is to have the power to deflect them upward. A well filled reservoir of ready, needed public works plans, subject to national control as to when and where, will provide the power to deflect unemployment spirals upward.

If, after the war, business miracles happen, we need not and should not tap our reservoir for more than the volume of public works required as a stabilizer. The draft we make on our reservoir should be in inverse ratio to the size of the miracles. It may be that a less-than-normal volume of public works will be required immediately to fill out the total construction demand. If private construction is found to be sufficiently miraculous to absorb all available construction labor and material, we should hold back our public works reserves until sagging of the construction line warrants committing our reserves to maintain the job capabilities of the construction industry. Under central control that reserve should be so directed that it will complement private industry but not compete with it for materials or labor.

The coming transition period lies like a dark and unknown river between the war and the era of peace which we hope will bring great prosperity to America. We may find the river so shallow that we can wade across, or it

may be swift, wide and deep. The construction industry, backed by a substantial reserve of public works, can be prepared to bridge the stream and get us safely over.

We are not now making the necessary preparations fast enough or in adequate volume. Unless the engineers, architects and men of the construction industry, singly and in groups, become evangelists to convince the people of the absolute necessity for these preparations, the nation may awaken too late to its need. We may be closer to that unknown river than is generally considered. The *invasion* brings added emphasis to the fact that the time left to get our bridging materials ready is running out fast. We must greatly accelerate the speed of planning for both private and public con-

struction, if we are to be ready for eventualities when the war ends.

When that time comes we still will be a nation with great natural resources and a productive capacity greater than ever before. We will be faced with the inflexible necessity of increasing our national income far above pre-war levels. We will have an abundance of manpower—yes, and womanpower, too—with which to produce the goods and services our own country and a war-devastated world so sorely need. It remains to be seen if we have the intelligence and the faith to use our planning resources in a manner genuinely beneficial to ourselves and our Allies. Having planned well how we shall win the war, we must also plan to assure ourselves a future of peace, productivity and prosperity.



## Employee Organization in the Professional Field and the Public Services

By A. M. Rawn

AN interest in the economic welfare of the professional employee has led the author to examine into that individual's relative value to, and reward from, society as well as to inquire to what extent the professional employee's characteristics may influence him to disregard pertinent social changes in his environment. In common with many others the author has felt some anxiety about the success with which the professional man, essentially an individualist, might breast the current of events alone, or where he might wind up if he let others, strong and united, act for him. The examination has also led in the direction of that individual known by the inclusive term, "white collar" employee, as well as toward the public employee. It takes a broad picture of the entire background of employment to begin to comprehend why the professional and white collar employees more often than not have remained economically static, while those who work in the trades and crafts, as well as those who labor, forge ahead financially in a manner which leaves the brethren of the pencil, pen and slide-rule, in a state of bewilderment and some envy.

A paper presented on June 14, 1944, at the Milwaukee Conference by A. M. Rawn, Ch. Engr., and Gen. Mgr., Los Angeles County Sanitation Dist., Los Angeles, Calif.

The issue presents a confusing picture, lacking in proper perspective, constantly changing, both as to the canvas and the artists, but through all the welter of confusion run certain threads of cause and effect from which some conclusions may be drawn and which incline one to the belief that with care and understanding, a better relative balance is obtainable.

The author hopes to illustrate that the increasing strength of, and deference to, labor are steps natural to the sequence of events accompanying a growing national intelligence and unity; that the somewhat astonishing disparity between values placed upon labor, crafts and trades on the one hand and professional or "white collar" work on the other, is, to a considerable degree, the result of an apathetic attitude toward their members' economic welfare by organizations composed of professional men and "white collar" workers, or their indifference to, or lack of familiarity with, the opportunities presented to them; also that although organized labor may be forced into a more responsible position, it will still continue to flourish and expand its influence and is a potent factor to be reckoned with in consideration of the future.

When the first employee went to work for the first employer, a degree

of mutual dependence must have been recognized. The employee's dependence was probably by far the greater because, while the employer needed him to facilitate the production of services in anticipation of profits, the employee needed the employer in order to buy the everyday necessities with which to live. The employer might select any one of many individuals. Carried to its conclusion, this reasoning leads one to the understanding that employees need employers more urgently than the reverse, and therefore in the ordinary course of events, the employer has by far the greater bargaining power. For years it was unlawful for employees to disturb this relationship by organizing or by group action.

The author's early employment as an engineer took him into a wide variety of construction camps and permitted him, in the early years of this century, to observe labor under many different conditions. Unaware at the time that what was observed had to do with employer-employee relations, the author now realizes that it was a most important factor, and that the change which has taken place in the economic welfare of the laborer or craftsman is as much due to the change in character and intelligence of the laborer as to any other factor.

It is recalled that there were construction camps in which the racial division between laboring gangs was as sharply divided as are the nationals of Europe. Entire gangs were recruited for some particular job from local areas of Austria, the Slavic countries, Italy, Germany, Russia, Poland and elsewhere. In some construction camps, as many as three or four different groups of European nationals, totally unable to speak English or to comprehend the language of the other gangs,

would be working on various jobs. There was no more unity of thought among them; no more mutual confidence; no more comprehension of one another's thoughts and ideas, than there appears to be among European countries today. They were foreign to the land in which they were working and each completely foreign to his neighbors.

### Wages and Immigration

Small wonder that these gangs of men looked each to an individual to take care of them and had no thought of pooling resources with nationals of other groups. They knew little, if anything, about America, American ideals, business, construction methods, privileges, schools or anything else. They had been attracted by wages which seemed to them extraordinary in their own countries but which turned out to be moderate in their new environment. Tens of thousands stayed permanently in the United States. Immigration was at its peak. The common labor class in America was composed to a material extent of negroes and European nationals, the latter unacquainted with their new surroundings and with one another.

In the midwestern city in which the author lived during the early part of the century, an area vaguely described as "the better part of the city" was occupied by native-born Americans, mostly with comparatively short Anglo-Saxon names. There were however about a dozen other communities within the corporate limits, each occupied by European immigrants, as totally different from one another as are European countries. Each had brought the customs of the old world to the new, and each immigrant settlement mirrored strongly the mother country of its in-

habitants. These foreign quarters furnished most of the labor.

### Education Changes Concepts

The sons and daughters of these immigrants who received common school education and absorbed some of the intangible and unmeasurable benefits of life in this country began to discard the customs and habits of their fathers. Some of the children went to universities. Immigration laws changed drastically, curtailing the flow of new settlers to America and no longer was there a vast horde of central Europeans annually pouring into the United States to supply the labor market. As the elders reached and passed the age of usefulness, there were none of their temperament or disposition to supplant them; the youngsters were learning, or had learned, how to narrow the gap between themselves and better informed classes and began thinking of something beside the paternalistic employer-employee relationship which had theretofore existed. Increasingly familiar with American laws and customs, and having a feeling of being part of the country, they began to desire a greater interest in the employer-employee partnership and to understand how to go about acquiring it by collective action. In this pursuit they were aided and encouraged by the American Federation of Labor, organized in 1881, and to some extent by independent unions and the International Workers of the World.

With the advent of education (even a very limited education), an understanding of a common language, and an awareness of the advantages of America and its customs, there ensued first, less misunderstanding among those who labored and later mutual

trust and cooperation. At first only the most intelligent of the skilled craftsmen and mechanics organized for their mutual advantage, to be followed from time to time by other crafts and trades. Finally, with the enactment of recent federal laws, practically all who work as employees are entitled, encouraged and helped by federal agencies to organize for collective bargaining.

### Crafts and Guilds

Organized labor—crafts and guilds—enjoyed privileges and opportunities in Europe and portions of the British Empire long before they were organized here. The older craft and guild organizations of the last two or three centuries were in part aimed at the same result: the protection of the craftsman in his job by restricting the number of available craftsmen; the perfecting of workmanship; refusing to cooperate with unskilled workers, etc. etc. The expansion of organized labor in this country has kept step with progress toward national unity of speech, customs and ideals.

Although many craft and trade unions existed in the United States at and prior to the turn of the century, effective federal recognition of labor did not begin until about 1903 when a cabinet post of commerce and labor was established. Around 1913 the United States Conciliation Service was formed to facilitate employer-employee relations. The Railway Labor Act which gave railway workers (one of the most closely-knit crafts in the United States) the right to organize without interference or coercion, was enacted in 1926, to be followed fairly closely by the Norris-LaGuardia Anti-Injunction Act which allowed workers in wider fields to organize. The A.F.



of L. is an old organization. Established in 1881, by 1905 it had a membership of over 2,000,000, and it is worthy of note that the A.F. of L. was inclined to organize by crafts and trades and that the heterogeneous union was not a part of its scheme of things. This, it seems, would imply that it was formed with the thought that cooperation and mutual trust were not yet characteristics of all labor, but rather of groups, each with a well-defined community of interest.

### Wagner Act

The National Industrial Recovery Act of 1933 broadened still further the field of labor organization and permitted labor to organize and bargain collectively without employer interference. The National Labor Relations Act of 1935, known as the Wagner Act, not only grants employees the right to bargain collectively, but sets up legal machinery to assist them in doing so. Supplementing the N.L.R.A., the Fair Labor Standards Act was passed in 1938, prescribing minimum wages and maximum hours of employment. The National War Labor Board, established to serve during the present emergency, does not have jurisdiction over industries not connected with the war effort, but it does have as its objective the settlement of employer-employee differences and stabilization of wages in war industries in both inter- and intra-state commerce. Its powers are very great.

With the exception of individuals employed as agricultural laborers, domestic servants, or those employed by parent or spouse, employees in interstate commerce are now granted the right to organize and bargain collectively. Fourteen million workers in America have taken advantage of the

opportunity, and today organized labor constitutes one of the strongest forces in our national life. Well out of its swaddling clothes, it is, in fact, a sturdy young giant occupying one of the important places in our national councils. One cannot logically anticipate that organized labor will do other than eventually reach maturity with a full consciousness of its responsibilities and with its privileges and opportunities extended to all who are employed.

In the minds of many, organized labor and collective bargaining are synonymous with strikes, violence, the closed shop and the New Deal. With the country's tremendous industrial upsurge and the enormous increase in union activity in the past quarter century, this is not an unusual deduction; but actually the first federal intervention and national interest was aroused by a strike of the United Mine Workers in 1902 for the settlement of which President Theodore Roosevelt appointed an arbitration committee which resolved the difficulty by awarding shorter hours and better working conditions generally to the miners. Every legislative enactment of the federal government on behalf of organized labor since that time, has had as its stated or implied objective the elimination of strikes, work stoppages and lockouts. The last and most liberal of all (the N.L.R. Act) sets out in the preamble (Section 1) the following general reasons for the law:

"The denial by employers of the right of employees to organize, and the refusal by employers to accept the procedure of collective bargaining lead to strikes and other forms of industrial strife or unrest . . ."

"The inequality of bargaining power between employees who do not possess full freedom of association or actual liberty of

contract . . . substantially burdens and affects the flow of commerce. . . ."

"Experience has proved that protection by law of the right of employees to organize and bargain collectively safeguards commerce from injury, impairment or interruption . . . by encouraging practices fundamental to friendly adjustment of industrial disputes arising out of wages, hours and other working conditions and by restoring equality of bargaining power between employers and employees.

"It is hereby declared to be the policy of the United States to eliminate the causes of certain substantial obstructions to the free flow of commerce . . . by encouraging the practice and procedure of collective bargaining and by protecting the exercise by workers of full freedom of association, self-organization and designation of representatives of their own choosing for the purpose of negotiating the terms and conditions of their employment or other mutual aid or protection. . . ."

Whether or not one agrees with the motives expressed in the above, it must be admitted that difficulties between labor and management cannot all be attributed to the panacea of federal labor legislation which has been offered as a means of curing such difficulties. Neither labor unions nor labor legislation are innovations although in the past 12 yr. labor has gained great advantages in the expansion and extension of the privileges and assistance offered it by the federal and by some state governments. There is little if any hope of subtracting from these rights and privileges. It is reasonably clear that the curve of progress and privilege for labor will continue upward, coupled perhaps with a demand from labor for greater recognition of the responsibilities it now holds in national affairs.

### The Professional Employee

National progress in this democratic country cannot help but result in a more and more enlightened manual trades and labor, which in turn implies

a stronger and more responsible laboring class. What is the position of the professional, the "white collar," the public employee, in this great social transformation?

The professional employee desires above all things to have his professional status recognized as his strongest community of interest with his fellows. He desires that negotiations relating to his wages, hours of work and conditions of employment be made either between himself and his employer, or between representatives of his own collective choosing and his employer; and that those who represent him share in his community of interest, understand his principles and ideals and, in effect, have the professional point of view. Individually and collectively he is opposed to having his bargaining rights assumed by non-professionals, and matters relating to his wages, hours and working conditions, settled with his boss by them.

For a number of years labor unions made no effort to organize professional employees. However, in 1933, the C.I.O. organized a union known as the Federation of Architects, Engineers, Chemists and Technicians (F.A.E.C.T.) and about the same time the A.F. of L. grouped a parallel union known as the International Federation of Technical Engineers, Architects and Draftsmen's Union (I.F.T.E.A.&D. U.). These two unions, with current membership about 10,000 each, are generally sub-professional in character, although both have many professional members and neither is averse to including on its membership rolls all of the professionals it can garner below the status of employer. Professional men, particularly chemists and engineers, have had to call upon the resources of their technical organizations

to prove that they were professionals, that as such they had a community of interest not common to non-professionals, and were entitled to be excluded from heterogeneous bargaining groups designed to include those of professional and non-professional status.

The mere being able to stay out of the heterogeneous bargaining group is not enough to prevent the representatives thereof from assuming the bargaining rights of the professional employee in an office which has been organized; neither is it enough to permit him adequate representation to his employer upon wages, hours and working conditions. To protect himself fully from domination by non-professionals, he must not only insist that he be excluded from trades and labor organizations, but if necessary must be prepared to organize and bargain collectively in his own behalf. A clear understanding of his rights and privileges under the law, is a necessary prerequisite to any activity in this respect. The law does provide for him, and all of the advantages extended to any other employee are his, if he desires to avail himself of them. The nature of his work, and the inherent individualism which is so strong a characteristic of the professional man, have many times restrained him from seeking such advantage as the law offers—at times to his great disadvantage.

His reticence is entirely understandable. He is not a laborer in the sense of doing manual work or indulging in the trades and crafts. His work is essentially scientific and learned, and until he found that his professional relations with his employer were being settled by representatives of the trades and labor groups, he took comparatively little interest in the legal privi-

leges to which he was entitled. His indifference to his own plight probably accounts in large measure for the value which society places upon his efforts. Concerted collective action by trade and labor unions has forced employers to narrow almost to the vanishing point, the financial gap between the laborer and sub-professional on one hand, and the professional on the other.

The future, which in all probability will see the privileges and power of labor expanded, must be viewed by the professional employee in a practical manner. He must become familiar with the laws regulating employees and employment and must be prepared to assume for himself, individually or collectively, all of the rights and privileges which the law extends to employees.

### Organizing "White Collar" Workers

The "white collar" workers, described by Senator Thomas of Utah as the twenty million forgotten Americans, have been practically lost in the progress that labor has made. Only recently the two major labor organizations of the country have intensified their efforts to organize office workers. Where inequalities in compensation exist, their arguments detailing the economic values to be gained from organization will fall on fertile soil, and there isn't much doubt but that they will succeed in recruiting tens of thousands of office employees. Where office employees find their employment conditions congenial and have no reason for changing them, the effort may not meet with very much success. The author's personal opinion is that as labor develops a greater consciousness of its obligations and responsibilities, its alliance with the "white collar" group will become stronger and collec-

tive bargaining will be more and more extended to that particular stratum in the employee class.

### The Position of Public Employees

The National Labor Relations Act states: "The term 'employee' shall include any employee . . . but shall not include any individual employed as an agricultural laborer or in the domestic service of any family or person at his home or any individual employed by his parent or spouse." This would appear to permit the organization of collective bargaining units by any employees excepting those specifically mentioned, and would not exclude employees of the United States or of any state or political subdivision thereof. In the same act, however, it is stated: "The term 'employer' includes any person acting in the interest of an employer directly or indirectly, but shall not include the United States or any State or political subdivision thereof. . . ." Thus it would appear that while employees of the United States or any State or political subdivision thereof, have the right to organize and bargain collectively, they cannot invoke the law to force their employers to adjust inequities or change wages, hours or working conditions.

Public employees have no standing before the wage and hour division of the Department of Labor, because in that act the definition of an employer is as follows:

"Employer includes any person acting directly or indirectly in the interest of an employer in relation to an employee, but shall not include the United States or any state or political subdivision of a State. . . . An employee is defined as 'any individual employed by an employer.'"

Thus it appears that while employees of the United States or a state or any

political subdivision thereof have the right to organize and bargain collectively, their employers, not recognized as such by the National Labor Relations Act, are not bound by the law to bargain with them. Further, it is apparent that the public employee has no recourse to the wages and hours act. Thus while the right to bargain collectively is not denied him, he cannot legally compel his employer to do certain things which other employers must do.

In effect, this means that public employees can join together for collective bargaining purposes and bargain with their employer, but they cannot take a dispute for settlement before the National Labor Relations Board or the National War Labor Board. The author need hardly make the statement about organizing because you are all well aware that literally thousands of public employees in the United States are organized for collective bargaining purposes.

### Right to Strike

The right of public employees to strike is an interesting speculation about which much has been written. Three well-qualified authorities have answered the question: "Have public employees the right to strike?" by stating respectively, "Yes," "No" and "Maybe." It has been argued as fundamental, that because government does not function for private profit, public employees are not exploited. The first of these authorities, the one who answered "Yes" to the question posed in this paragraph, says this is not so because government under pressure of economy produces the same effect in low wages as does private employment, and that therefore public employees often are exploited and need all the

benefits of collective bargaining. He continues that in striking, the action is not against the state or government as such—that it has no political motivation—but is aimed at politicians or administrators and is thus exactly like a strike in private industry. He cites a study made by Columbia University of over 1000 strikes in the public services, in which no single action pointed to the contrary.

The individual who states that public employees do not have the right to strike, says in effect that no employee has the right to interfere with the orderly conduct of public affairs without the people's consent; that the right to do so should be regarded in the same terms as the privilege granted individuals by the people to sue the State; and that not until the people recognize by law the right of public employees to refuse to obey their superior officers under specified circumstances and strike against the actions of public officials, is there any right on the part of public employees to strike.

The third writer says, "Maybe." He remarks that denying the public employee the right to strike is based upon the theory that government, as custodian of final authority in the land, cannot permit those whom it hires to carry on its work to challenge its authority. He continues that federal employees are not forbidden to strike and says that when the state denies its workers the right to strike merely because they are government employees, it defines common labor disputes as attacks upon public authority and makes the use of drastic disciplines and armed force a method of handling otherwise simple industrial relations. This writer continues, in effect, that a free labor movement among the millions of public employees is their only effective

check upon the greatly enhanced power which expanding governmental activity gives to public authority.

You may subscribe to any one of these views, or any other which best suits your own reasoning. They have been cited to illustrate to you that the country has not as yet found the answer to public employees' difficulties nor prescribed a rational employer-employee relation in such service. Public employees do organize and, upon occasion, they strike; and it is yet to be determined whether they have the legal right to do so.

### The Future

It would seem that in order to judge of this whole affair with any reasonable degree of accuracy, one must approach it with an entirely open mind and admit that one is confronted with facts and not theories.

Collective bargaining as manifested by labor union activity is one of the strongest and most potent forces in this nation today, and in view of the experience which has been gained in the last two or three centuries and particularly in the intensified industrial era represented by this, the twentieth century, it is bound to be strong in any democratic form of government. Concessions from a powerful group to a less powerful one are seldom if ever voluntary; and the recognition of labor by capital as an influential and, at times, controlling partner in industry, is no exception.

Labor has forced capital into its present position and democracy, operating as it does in this republic, appears to be bent upon protecting the privileges which labor has gained. If the curve of events which has marked the evolution of collective bargaining here during the past forty years is any in-



dication of what is to take place in the future, one can look forward to the privileges of collective bargaining, and the help and encouragement to bargain collectively in some form or another, being extended to all employees in the entire country not many years hence. Those who operate public enterprises may, within a short time, feel the pressure of labor upon their methods and practices with full legal sanction.

Whether you like it or not, those are things with which you are confronted.

It is earnestly recommended that you keep alert to the situation that if you have not already done so, you organize in committee to keep yourselves fully and adequately informed of the trend of labor activity in the municipal and public service field, and at all times be entirely aware of the rights and privileges accorded to both employer and employee. With respect to the latter, include the professional and "white collar" employees as well as trades and crafts.

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## Automatic Residual Chlorine Indicator and Recorder

By D. H. Caldwell

**I**N those plants where variations in raw water chlorine demand are large and unpredictable, a continuous indication and record of residual chlorine is a desirable feature. It is but a step from automatic residual chlorine indication to automatic control of chlorine dosage to give any desired residual. The purpose of this paper is to describe results of two years' operation of the automatic photoelectric residual chlorine recorder at Springfield, Ill.

The first model of the recorder was installed late in 1941 and was patterned after the instrument at Montreal, Canada, described by Harrington.\* Some difficulties were experienced in the operation of the first model, but the solving of some of them resulted in a more compact, reliable and convenient form of apparatus.

The instrument utilizes the ortho-tolidine reaction in the alkaline or blue color range recommended by Harrington.\* The recorder has a range of from 0 to 1.5 ppm. of residual chlorine, and even with this comparatively wide range has a sensitivity of approximately 0.01 ppm. The residual is recorded by means of a standard Leeds and Northrup, round-chart, recording

potentiometer of from 0 to 50-mv. range. The instrument panel is illustrated in Fig. 1 and a typical 24-hr. record of the residual chlorine is shown in Fig. 2. The instrument is checked daily for zero adjustment of the photocell. This is done by turning to waste the ortho-tolidine solution feed until the water passing into the color cell is free of the reagent and then adjusting the iris diaphragm until the microammeter or recorder indicates zero. This daily check is made necessary as a result of the gradual staining of the glass walls of the color cell by the ortho-tolidine reagent. The magnitude of the error due to staining, accumulating over a 24-hr. period, is small, as can be seen from Fig. 2 by noting the reading before and after adjustment. The ortho-tolidine solution is replenished weekly.

The chart indicates the residual chlorine in terms of millivolts which bear a semi-logarithmic relation to the residual expressed in parts per million of chlorine. The conversion is made by formula or by means of the conversion graph, shown in Fig. 3. The effective range of the instrument is dependent upon the length of the light path through the color cell. For example, doubling the depth of the color cell would move the calibration curve from position A to position B in Fig. 3.

This instrument differs from the

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\* Photo Cell Control of Water Chlorination. Jour. A.W.W.A., 32: 859 (1939).

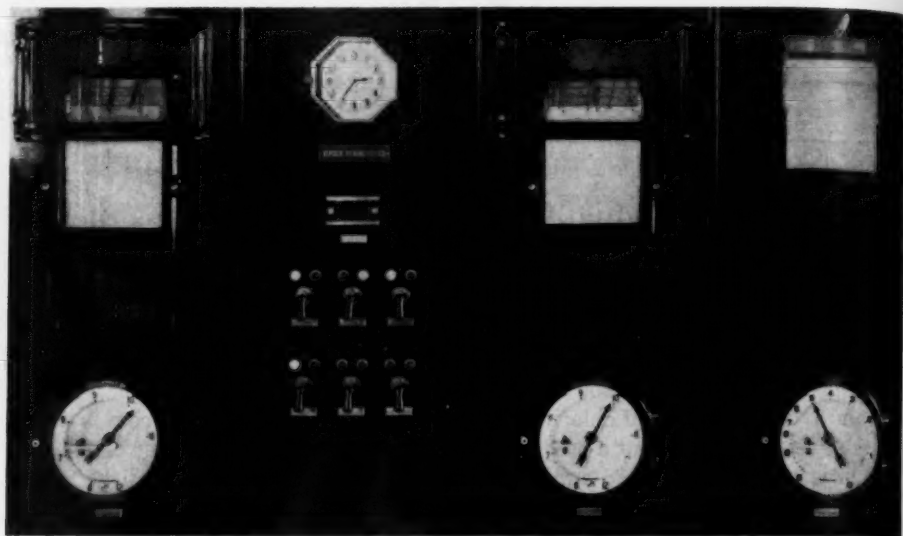


FIG. 1. Instrument Panel of Springfield, Ill., Water Softening Plant. Residual Chlorine Indicator and Recorder Lower Right-Hand Corner.

Montreal unit in the use of a microammeter, located at the photocell, an arrangement that facilitates the calibration and the daily zero adjustment, especially if the photocell is located at some distance from the recorder. The microammeter is continuously in the recording circuit, the recording potentiometer being connected across the terminals of the microammeter.

#### **Turbidity—Color Compensation**

No attempt has been made in this instrument to compensate for turbidity or color of the water. If the residual is maintained at 0.1 ppm. or more, it is doubtful if turbidity-color compensation is necessary except, possibly, for raw water turbidities of 20–30 ppm. or more. Even in those instances where the turbidity exceeds 20–30 ppm., no error is introduced, provided the turbidity does not vary appreciably between checks for zero adjustment. In treated water, no compensation for turbidity is required.

Attempts have been made to correct for turbidity and color with a two photocell circuit. True compensation is attained in an instrument employing two photocells only when the current from the clear-water cell exactly balances the current from the color cell. It is not sufficient to measure the difference in current between the clear-water cell and the color cell, because in a circuit of this type turbidity and color effects are the same as in a single photocell circuit. A self-balancing, fully automatic, two photocell circuit of the type necessary for turbidity compensation would be considerably more expensive than the present model, and in most cases increased precision of the results would not justify the added cost.

#### **Description of Instrument**

The recorder consists essentially of two separate parts—the light system and the color-development system. Various parts are shown schematically

in Fig. 4. The light system consists of (A) a constant voltage source; (B) a light bulb; (C) an iris diaphragm; and (E) self-generating photoelectric cell of the barrier-layer type; together with (F) a small microammeter; and a recording potentiometer. The color-development system consists of (H) a reagent reservoir; (I) a mixing funnel and a retention chamber; and (D) a color cell.

A constant-voltage transformer of about 250-v. capacity is an indis-

pensable part of the equipment. In the present instrument, a Sola 250-v. 110-v. constant-voltage transformer supplies current to a 250-w. floodlight lamp. The variation in light intensity from a source of this type is very slight and equal to about 0.25 per cent for a variation of input voltage from 90 to 130 v. The iris diaphragm has a maximum opening of  $1\frac{1}{4}$  in. and is placed as close as possible to the light. The light beam from the filament of the bulb passes through the iris dia-

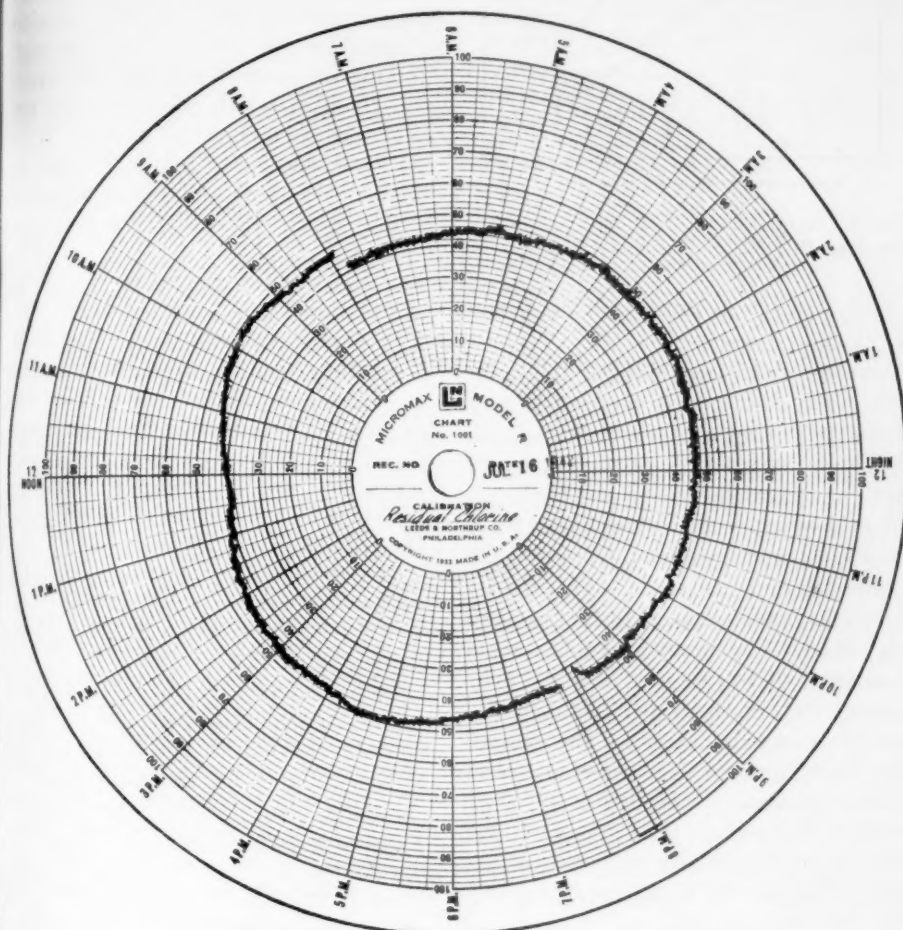


FIG. 2. Twenty-Four-Hour Record of Residual Chlorine in Treated Water.

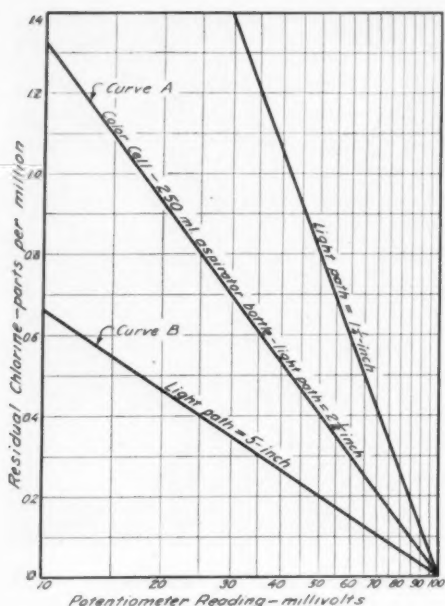


FIG. 3. Graph Used to Convert Chart Readings to ppm. of Residual Chlorine.

phragm and color cell, and impinges on a Weston Model 594 YR, Type 3 photronic cell placed behind the color cell. The color cell is enclosed to prevent the entrance of extraneous light.

The leads from the photoelectric cell are connected directly to the terminals of a Weston model 201 microammeter of 200- $\mu$ a. as maximum reading and 370 ohms internal resistance. This microammeter is built especially for use with the Model 594 photronic cell. With a reading of 140  $\mu$ a., the potential drop across the terminals of the microammeter is exactly 50 mv. The recording potentiometer is connected across the microammeter terminals, and thus, without affecting the microammeter reading, records the voltage drop across the terminals. It is not necessary that the recorder be near the photocell or microammeter.

### Chlorinated Water Used

A continuous flow of chlorinated water after a predetermined period of contact enters (G) the constant head tank in Fig. 4. An immersion heater of 100-w. capacity, controlled by a bimetallic thermoregulator, serves to heat the water to a temperature of 20° C. during the winter months.

From the constant head tank the water flows through a glass orifice of such size that the rate of flow is approximately 100 ml. per min. The orifice discharges into a mixing funnel into which the ortho-tolidine solution is added at the rate of 2 ml. per min. The mixture then flows into the retention chamber which allows 5 min. for color development. After the color has developed, the solution flows to the color cell, a 250-ml. pyrex aspirator bottle, which is easily removed for cleaning.

A 5-gal. glass carboy serves as an ortho-tolidine reservoir and holds sufficient reagent for 8 days' operation. A constant head arrangement provides for a uniform rate of addition of the reagent. The effective head is maintained at about 2 to 3 in., and minor adjustment in flow can be made by raising or lowering the air-inlet tube. The capillary tip through which the reagent flows is attached to a movable block to permit diversion of the solution during the daily check without disturbing its rate of flow.

Ortho-tolidine reagent contains 0.7 g. of ortho-tolidine per liter of solution and enough HCl to lower the pH of the water to its optimum value for maximum blue color development. This adjustment of pH is not sensitive, so that no trouble should be experienced from this source. The acidity of the reagent solution used for Springfield water is approximately 1 per cent



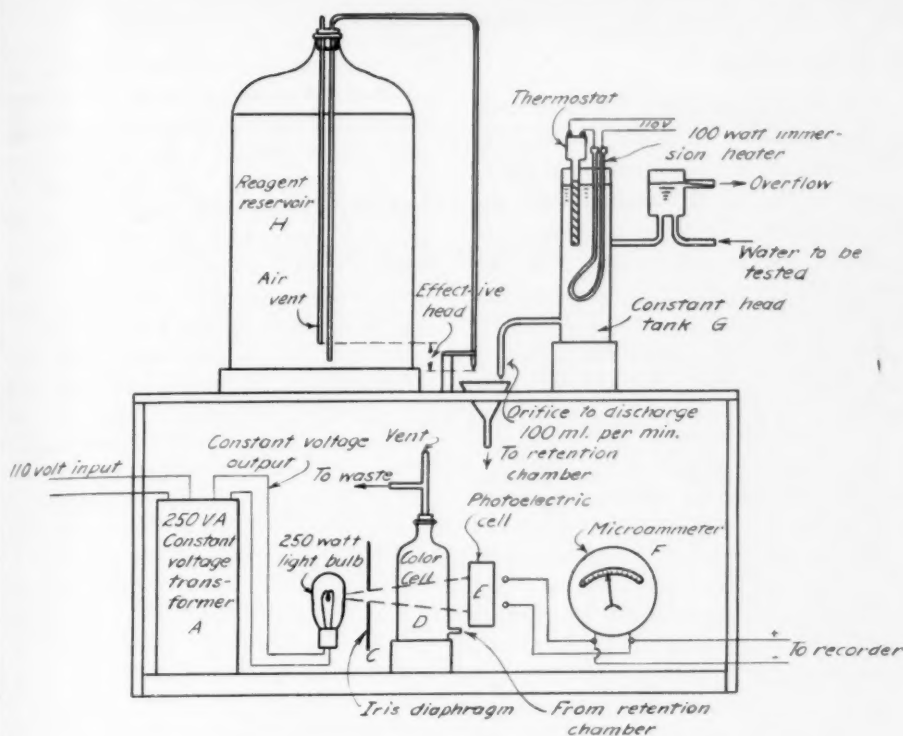


FIG. 4. Schematic Representation of Residual Chlorine Recorder Mechanism.

HCl. This will vary for different waters. It has been found that commercial muriatic acid is fully as satisfactory as cp. HCl for making the ortho-tolidine reagent. The reagent is de-aerated with an aspirator pump prior to use. This prevents air binding in the siphon tube delivering the reagent to the mixing funnel.

The construction of the instrument herein described was made possible through the co-operation and assistance of Charles H. Spaulding, formerly Supervising Chemist, and Charles Hartman, Chemist, of the Springfield filtration plant. The operation of the

instrument was under Mr. Spaulding's direct supervision until recently, and at present is under the supervision of C. C. Larson. A recent communication from Mr. Spaulding states that throughout this period the instrument has operated without interruption, and that the results have been entirely satisfactory. Particularly there has been excellent correlation between the recorded results and observations made in accordance with "Standard Methods" in the acid range. It is believed that a continuous record of residue chlorine will enhance the safety of any chlorinated water supply.

### Discussion

#### C. H. Spaulding †

The equipment which Caldwell built at Springfield is a valuable addition to the devices for protection of a public water supply. Both the continuity and the impersonal record are outstanding features. It is not thought that this record should entirely replace tests for residual chlorine made in the usual way according to "Standard Methods" of the A.P.H.A. and A.W.W.A. The question may arise as to whether the

measurement of residual chlorine in the *blue* range of pH gives the correct values in all cases. This is an academic question for which I do not have the answer, but which I do feel is not of importance, since the machine can be made to check with the yellow orthotolidine over a 24-hr. period. It is far more sensitive to slight differences than can be detected by the eye. It has always seemed to the writer that the temporary interruption of chlorine was a hazard which would ordinarily be difficult to detect. In the correction of this weakness of chlorination, the recorder serves a very useful purpose.

† Engr., C.E., Water Supply Equipment Branch, Engr. Bd., Fort Belvoir, Va.

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## Does the Team Know the Score?

By Elizabeth McDonnell

IN early days the water supply industry was chiefly concerned with building, operating, engineering, distribution and finance. Getting the water, delivering it to customers and receiving the money to conduct the business—these were the problems which confronted water works officials. Then came a period when purification, —the development and its application —was one of the chief problems.

As the number of customers grew, larger staffs were necessary to handle increased business. As the companies and water departments became bigger, management's responsibilities mounted and its personal contact with employees necessarily had to shrink. Personnel problems started to appear.

Employees are sensitive human beings whose main motives are not necessarily the material ones of wages and hours. People cannot be taken for granted. A pay envelope does not automatically assure a worker's devotion to duty. Loyalty is something we feel toward friends and the people we love, not toward strangers or acquaintances. Management realized these things and set about to re-establish the personal contacts which had existed when companies were small.

A paper presented on November 6, 1943, at the fall meeting of the New Jersey Section, Atlantic City, N.J., by Elizabeth McDonnell, Editor, *Water*, American Water Works & Electric Co., New York, N.Y.

One of the ways—and a very effective one—that water works companies have taken to re-establish a feeling of mutual respect and harmony has been to tell their employees what was going on. They recognized that employees were playing on the team and that they had a right to know the score; not only because the successful outcome of the game depends a great deal on the co-operation of the players but also because, knowing the score, the team has more incentive to win. So management told them the score. And how did they do this? By the written word. They kept them posted through employee publications.

Now, you may say, "That's all right for a big company or a big water department but we couldn't do anything like that. It would be too expensive and, anyway, everybody knows everybody else in our company. They all know what's going on."

If you have less than ten employees, I'll agree with you. You don't need an employee publication. However, you still need to tell the players the score. With such a small staff, you can do so by word of mouth. The activity should be organized into periodic staff meetings.

If you have more than ten employees, and are not now getting out regularly some kind of publication,

whether it be a bulletin, a four-page leaflet, or a more formal appearing publication, you are passing up an unusually effective means of instilling in your employees a fine spirit of loyalty toward your company or department. (Incidentally, don't take this feeling of loyalty for granted). The written word is a powerful weapon. It assures your reaching every employee. It enables you to project your point of view.

An employee publication cannot be a substitute for a sound policy of fair dealings and a sincere attitude on the part of management, but it can be an *expression* of that policy and that attitude.

Just what is an employee publication? It is a common meeting ground for management and employees. As mentioned before, when a company is very small, the boss can get around and have a chat with each employee, every week or so or regular staff meetings can be organized. As an operation grows and more demands are made on the supervisors' time—which is particularly true today—close personal contacts with the staff are apt to become less frequent. But they needn't be lost. An employee publication can pinch hit in such a situation. It can substitute for the friendly pat on the shoulder and the, "Heard lately from that fine son of yours out in the Pacific, Joe?" It supplies the friendly note between management and the employee and thus makes for mutual understanding. It gives the employee a feeling of being part of the organization; that he belongs.

By employee publication I do not mean only an 8-, 16- or 32-page magazine printed on slick paper. It can also be a bulletin, a leaflet or a letter. It can be mimeographed, multigraphed or run off on a ditto machine.

How are employee publications regarded? Except for the depression years, the number of employee publications has steadily increased. Even during the depression they rode out the storm with comparatively few shipwrecks. In these days of tremendous production records, they are booming. For many companies know their value as morale builders and good morale increases production. The government, too, recognizes this fact. WPB allots the necessary paper. The Army, the Navy and the Treasury have established publicity departments just for the purpose of supplying material regularly to employee magazine editors. You all know the restrictions on magazines for servicemen overseas due to the overtaxed postal facilities. Employee magazines weighing up to 8 ounces—which allows for a good size one—are permitted to be sent.

In England, where daily newspapers have been drastically reduced in size because of the paper shortage, employee magazines are still being published and their size is pretty much unchanged.

Employee magazines are many things to many different operations. From a survey made, here are some things a number of companies said their employee publication does for them:

1. It draws individuals into closer contact with the company.
2. It brings about better understanding between management and employees.
3. It helps employees to understand each other.
4. It promotes loyalty, pride in the job an employee is doing, as well as pride in the company's role in the community, in industry, in the war effort or all three.

5. It stimulates an interest in safety.
6. It promotes unity and a sense of team play.
7. It brings about a quick and welcome assimilation of new employees.
8. It promotes a common interest in the success of the company.

Now, how does one go about establishing, through an employee magazine, these many fine attitudes which bring about better efficiency and progress?

### Promotional Aids

It is done by explaining company policies, by informing employees about company aims and giving them company news, as well as news about employees and their activities. Organization policies and aims are explained through messages from the executives and through articles and editorials. Articles or news items can show workers the part they play in the business. Articles can interpret employees' work in relation to the war effort.

In the water works field, write-ups can deal with the huge quantities of water required to produce weapons of war. For example, one 28-ton tank requires the factory use of 100,000 gal. of water. This amount does not include the water required in the manufacture of steel and cast iron. If war weapons are made in your towns, a direct application of this theme can be made. Whether or not you are serving war plants, the article can point up the vital role of pure water in maintaining the community's health, thereby enabling people to carry on in the war effort. Personal interest items about employees—births, deaths, engagements, weddings, employees' hobbies, their sports and civic activities and articles on safety are always good

copy. War Bond sales can be stimulated. A very important part of employee publications is news about that company's servicemen.

The employee publication of the American Water Works and Electric Company is called *Water*. It goes to every employee of our 75 water companies and to every one at the Home Office. More than 3,000 copies are printed. Naturally, this type of magazine is not for a small operation because it would be too expensive. But there is something every water company and water department *can* do, regardless of size. You can get out a bulletin or a four-page booklet of company news, employee news and news about your people in the armed forces. You can get it out every week, every two weeks, once a month or as frequently as possible—the oftener the better. This job should be turned over to some one in your company or water department who has a flair for writing and a nose for news, as well as an eye for attractive arrangement. You'll discover that he or she will enjoy doing it and will take pains to set it up pleasingly. If you do not have a duplicating machine, you can get this type of work done reasonably.

### Collecting News Items

There are various ways of collecting news items. Have reporters appointed. Boxes can be placed around your plant and office. Ask all employees to contribute news and tell them where to send it. Find out who corresponds with your servicemen. That's always a good news source. Encourage employees to write to servicemen and thus develop news.

Making up your mind to do it is the important thing. How to go about



doing it will work itself out. But not by itself! It will need organization and push.

As to style, the main thing to remember is to be friendly. Articles on organization policy should, of course, be written in a dignified manner. Employee news and activities can be informal, chatty, light.

A few don'ts to stress are:

Don't write about controversial subjects.

Don't write down to your readers.

Don't preach.

Don't be humorous at the expense of any one. Humor must be used with care. Keep the stinger out of your copy. Humor that touches races, creeds, beliefs or affiliations should be out.

Don't go in for innuendo—"Which meter reader can be seen every Sunday afternoon strolling down Main Street with a blonde cutie?"

Don't use too much of any topic—too much company news, too much employee news.

As mentioned previously, a copy of our employee magazine *Water* is sent to all employees on military leave of absence. In addition, the Home Office and some of the managers of our water companies send newsletters to their boys and girls in the services.

We at our Home Office are fortunate in having an artist whose clever drawings liven up our servicemen's newsletter. A copy goes to each soldier,

sailor, marine or coast guardsman and a copy also goes to each one of our office employees, of whom there are about 225.

If you are not already doing so, you all can get out a similar newsletter. You will enjoy doing it. And the enthusiastic response from your service men and employees will be most gratifying.

The things said about contents, style and newsgathering, as well as the "don'ts," also apply to newsletters. In addition, you are strongly urged to include jokes. The boys particularly welcome humor.

We recommend that only one side of the paper be used if any copies are going overseas. If two sides of a sheet are used, anything censored on one side also cuts words on the other side. Remember the main taboo topics are troop and ship movements.

This is an all too brief summary of a subject to which much time and effort has been devoted for more than a third of a century. There is no question that an honest, well-edited employee publication helps to eliminate some of the rough spots which are apt to creep into relationships between employer and employee. If you wish to use this personnel tool make a careful study of what other organizations are doing and then adapt the best points which have been successfully pioneered by others to the needs of your own particular situation.



## Report of Conference on Drinking Water and Sanitation Standards

### *Introductory Statement*

A REVISION of the 1925 Drinking Water Standards was advocated by the American Water Works Association in 1935 and in 1940 the A.W.W.A. was invited by the Surgeon General to be represented on a Committee for revision of the standards. On September 25, 1942, the "Public Health Drinking Water Standards" were adopted by the United States Public Health Service, which standards superseded those adopted June 20, 1925.<sup>1</sup>

The "Manual of Recommended Water Sanitation Practice Accompanying United States Public Health Service Drinking Water Standards, 1942," was prepared by a technical subcommittee of the U.S.P.H.S.<sup>2</sup> This manual was limited to a general description of water supply systems and their operation. Conflicting views of members of the Advisory Committee were taken into account, but not completely resolved.

The Drinking Water Standards were discussed at the Cleveland Conference in June 1943, by a group of water works and sanitary engineers and U.S. P.H.S. representatives, from the viewpoint of the state sanitary engineer, with considerable dissension of opinion.<sup>3</sup>

In December 1943, a series of Emergency Minimum Sanitation Standards were offered for adoption by U.S.P. H.S., as a sanitation code by cities and states. These proposed sanitation standards when considered with the Drinking Water Standards, presented a number of problems to water works executives. The matter was considered at the A.W.W.A. Board of Directors' annual meeting on January 17, 1944, at which time a resolution was passed, requesting the reconsideration by the U.S.P.H.S. of certain portions of the Drinking Water Standards, and suggesting that the Surgeon General be asked to appoint representatives of the U.S.P.H.S. to confer with a committee of the A.W.W.A., with a view to modifying these sections.<sup>4</sup> The Surgeon General agreed to such a meeting and the representatives of both groups met on April 17, 1944, at Washington, D.C. The report of the meeting follows:

On April 17th, at the Washington City office of the U.S.P.H.S. (2000 Massachusetts Avenue) a conference was had between representatives of the Public Health Service and the American Water Works Association. This date was selected because it was the first time since the Board's meeting in January that President Morris and

<sup>1</sup> Jour. A.W.W.A., 35: 93 (1943).

<sup>2</sup> Jour. A.W.W.A., 35: 135 (1943).

<sup>3</sup> Jour. A.W.W.A., 35: 1409 (1943).

<sup>4</sup> Jour. A.W.W.A., 36: 213 (1944).

Past-President Wolman could both arrange to be in Washington. Mr. J. K. Hoskins of the U.S.P.H.S. was fully co-operative in arranging for the meeting. Assistant Surgeon General Draper acted as moderator of the meeting. The other representatives of the Service were: Messrs. Hoskins, Mountin, Tarbett, Streeter, Old and DeMartini. Messrs. Whittaker (Minn.) and Ehlers (Texas) were present by invitation of the U.S.P.H.S. The representatives of the A.W.W.A. were Messrs. Morris, Wolman, Weston (Mass.), Scott (Conn.), Cox (N.Y.), Bennett (Pres., Water Utilities Service Corp.), Shaw (Washington Suburban Sanitary Dist.) and Jordan.

Dr. Draper inquired if the purpose of the A.W.W.A. was to suggest a review of the Drinking Water Standards and possible revision. He was advised that this was correct. In the subsequent discussion the A.W.W.A. representatives agreed that, if the Surgeon General was in accord with a review of the standards and possible revision, a reconvening of the Advisory Committee for this purpose would be a proper procedure.

Mr. Jordan presented a statement entitled "The Relationship of the American Water Works Association to Federal Standards for Drinking Water." In briefing the statement, he invited special attention to the fact that the Association in 1935 had advocated a revision of the standards, and in 1940 had advised the Surgeon General that it welcomed the opportunity to be represented on the Advisory Committee for the revision of the standards. Reference was made to the further advice given to the Surgeon General that the A.W.W.A. was not prepared to assist in the development of Federal codes of water supply construction and opera-

tion. Finally it was noted that the A.W.W.A. Board officially did not approve the revised standards and that its representative had accepted them with certain expressed reservations. However, it was not until after the standards were published and carefully studied that the A.W.W.A. realized that certain sections set forth requirements that the association believed were unattainable.

Dr. Abel Wolman discussed the divergence of viewpoints relating to codes of practice sponsored or promulgated by Federal agencies, and recorded the opinion of the A.W.W.A. that the Drinking Water Standards should be confined to the exercise of the police power of the U.S.P.H.S. in control of sanitary conditions in interstate commerce. In amplification of this, he recorded his opinion that the standards should be confined to the statement of definite limits of water quality acceptable to the Service for use on interstate carriers. He further indicated his profound previous, as well as present, disagreement with the publication of the "Manual of Water Sanitation Practice" as a physical part of the official reprint of the Drinking Water Standards. He and other members of the Advisory Committee, in order not to block the revision of the 1925 Standards, made certain concessions and compromises the validity of which they questioned. The apparent reversal of viewpoint evidenced by certain Advisory Committee members in now appearing at this conference to object to the standards, was explained as due to support by the water works profession in objection to the issues which were compromised in development of the standards.

Messrs. Morris and Cox supported Dr. Wolman's comments. Mr. Cox

July 1944

### Interstate Quarantine Powers

The expressed divergencies of opinion concerning the general principles involved in the U.S.P.H.S. State/City relationships and purposes concerning the Standards for Drinking Water, led to the discussion of Section 1.6 as illustrative of the situation. Messrs. Weston, Scott, Bennett and Shaw expressed the opinions that in the exercise of its interstate quarantine powers, (1) the Public Health Service could properly concern itself with the water delivered to the common carrier but (2) should not make the conditions of the plumbing within consumers' premises an element of the certification of water used on interstate carriers. It was further recorded that few, if any, cities carry on the continuous reinspection of plumbing on consumers' property implied by the terms of Section 1.6; and, that however proper as a public health ideal, the impressment of plumbing surveys upon conformance to the Drinking Water Standard was impractical in fact and doubtful in authority. It was further observed that water works executives are only rarely given authority continuously to control the customers' plumbing, such powers normally residing with the building commissioners or the boards of health. It was firmly expressed by Messrs. Weston and Scott, that literal procedure under the terms of Sections 1.6 and 2.2 would result in *no public water supply in the U.S. being certified for use on interstate carriers*. Mr. Scott therefore proposed that Section 1.6 be amended to read: "Water supply system includes the works and auxiliaries for collection, treatment, and distribution of the water." Mr. Jordan pointed out that since the standards required the examination of distribution system

stated that much of the prevalent criticism of the Drinking Water Standards seems to be due to the lack of clarity as to jurisdiction, respectively, of the U.S.P.H.S., state departments of health and local water supply officials. For instance, the U.S.P.H.S., acting under the provisions of the Interstate Quarantine Regulations exercises supervision over the water supplies actually used by interstate carriers and has enacted the Drinking Water Standards under the provisions of these regulations. Secondly, any official certification of a supply used by an interstate carrier is predicated upon advice received by the Service from a state department of health acting as the "reporting agency." These departments, however, have no direct jurisdiction over interstate traffic and hence they act, by request, under the separate provisions of definite state laws which apply to all public water supplies whether or not they serve common carriers. Thirdly, local water supply officials have certain powers and duties based upon entirely independent laws, codes, etc. These powers and duties are supplemented in many municipalities by independent plumbing regulations, etc., administered by local health departments, building inspection departments, etc. It is evident that the U.S.P.H.S. may exercise specific supervision over the quality of the water actually used by a common carrier. Any regulations, however, that would specify how this quality of water is secured, would involve dealing directly with a local water supply official, which seems to be beyond the province of the Interstate Quarantine Regulations. The U.S.P.H.S. seems to recognize this situation, as it has delegated this supervision to the state departments of health as the "reporting agency."

samples and the reference to bacteriological quality of the water would be based upon these distribution system samples, the evidence of adverse effects upon the distribution system, if any, from conditions within consumers' premises and backflow therefrom, would be a matter of laboratory record. Dr. Mountin stated that he did not find anywhere in the standards or manual any attempt to place responsibility on the water utility for the conditions beyond the meter. From the public health viewpoint an attempt should be made to eliminate hazards whether they exist on one side or the other of the meter. The water works should be responsible for the quality of the product, the city for carrying out plumbing regulations. Unless there is unity on the problem of elimination of cross-connections and sanitary defects little progress can result. The definition given in Section 1.6 was prepared to be all inclusive in order to implement the necessary inspection and control by those having jurisdiction.

### Elimination of Hazards

After a general exchange of views Mr. Hoskins inquired if limitation of cross-connection and back siphonage checkups and elimination of such hazards to the service line or lines serving the common carrier from the main to and within the carrier's property, would appear reasonable to the water works people. He was assured by the A.W.W.A. representatives that this policy would meet with their approval.

Messrs. Weston, Scott and Cox proposed that the requirements re frequency of sampling be removed from the standards and placed in an advisory appendix, leaving in the standards only the first two sentences of Section 3.1. They likewise supported the viewpoint

that the distribution of sampling points and frequency of sampling should be left to the administrative judgment of the reporting agency. It was pointed out by all A.W.W.A. representatives that the principle of distribution system sampling was fully accepted and that there was no desire to advocate sampling only at the point of production of the public water supply. The representatives of the U.S.P.H.S. as well as Messrs. Whittaker and Ehlers supported the text of the standards as written, but there was some doubt expressed that the straight population sampling frequency ratio adequately covered the problems related to use of water by interstate carriers.

### Water Contaminants

Messrs. Cox, Weston and Jordan supported the deletion of the *shall* requirement of Section 4.1 and the transfer of the section to a position adjacent to Section 4.22, with the use of the word *should* instead of *shall*. It was pointed out that neither turbidity, color, taste and/or odor can be direct agents of physiological disturbance to the water user, if the supply under consideration meets the other precise terms of the standards. It was agreed that lead, arsenic and selenium are possible contaminants of water, limited amounts of which can be definitely related to the physiological response of the water user. Messrs. Wolman, Weston and Cox, as members of the Advisory Committee, were uniform in their recollection that the discussions of the committee had led to the understanding that what is now Section 4.1 would not be upon a mandatory basis.

At Dr. Draper's invitation Mr. Ehlers indicated his views concerning the standards. He stated that, in his opinion, the Advisory Committee which



recommended adoption of the standards under discussion, could not have been better selected, that their integrity was above question and on the whole that they had performed a commendable task in the revision. He believed the "Manual" was a useful guide and he as State Sanitary Engineer of Texas preferred to have this manual as a guide to the interpretation the Service might use in their evaluation of a water works system, even though he might not fully agree with the manual. He believed the minor points under discussion could be amicably compromised by the Advisory Committee. With regard to Section 1.6, Mr. Ehlers stated that the Attorney General of Texas had given an opinion to the effect that municipally-controlled water works did have jurisdiction to inspect consumers' premises for the existence of cross-connection or sanitary defects; however, it was questionable if this jurisdiction could be extended to privately owned water works. He also believed that it would be desirable to have the Advisory Committee serve as a continuing committee which might consider modifications of the standards annually in order to keep them harmonized with progress in the water works and public health fields.

Mr. Jordan filed memoranda prepared by Messrs. Howson and Hardin to indicate the need for substantial revision of the Manual of Recommended Water Sanitation Practice and requested, for the A.W.W.A., the opportunity to have an A.W.W.A. group review the terms of the document with the editors of the manual. It was further recorded that the manual is in technical disaccord with parts of other related U.S.P.H.S. documents such as the "Sanitation Manual for Ground Water Supplies." (It is believed that

the opportunity for later consultation and review will develop.)

A brief discussion of the "Emergency Minimum Sanitation Standards" followed. Mr. Hoskins advised the group that the A.W.W.A. had misunderstood the purpose of the recommended standards. He stated that they had been offered for adoption during the war emergency, in areas where population and related pressure had brought public health problems to small or new communities; that they had already served their purpose; and in his opinion could be withdrawn at the end of the war emergency and perhaps sooner. It was not intended to retain these Emergency Minimum Sanitation Standards as a permanent recommendation of Public Health Service. The A.W.W.A. representatives thereupon stated that if the standards were to be withdrawn there was nothing to discuss.

This discussion, as well as others which have preceded it, indicates a diversity of viewpoints which may be summarized in the following manner:

A. The interest of the U.S.P.H.S. in standards for water on interstate carriers derives from its interstate quarantine authority. Acting under this authority, the officers of the Service are entitled to stipulate that water placed in cars, etc., used in interstate travel shall conform to definite quality characteristics. If the water which a carrier proposes to place in a drinking water receptacle does not conform to these requirements, the Service may forbid its use. The presumption is that thereupon the carrier must find elsewhere water of a quality that will be satisfactory to the Service.

B. The U.S.P.H.S. officers, both in the 1925 and 1942 Standards have evidenced a tendency to extend this limited interstate quarantine authority by the implications of manuals, codes, etc., to cover general stipulations concerning the quality of water sold for public uses in the various communities;

the structural characteristics of the water works system; and the methods of operating water works systems. In the 1942 Standards, this tendency further extends to certain controls of the water piping in the private property of individual customers of the water utility.

The A.W.W.A. expressed opinion is that while the characteristics of water supply systems and the condition of the plumbing in consumers' premises in a city may have a bearing upon public health, the control of these conditions lies within the states and cities and cannot properly be considered as deriving from the authority under which the Service functions—its interstate quarantine authority. Water works executives historically are known to be responsive to their public health responsibilities and willing to construct and operate water systems in such fashion as to promote the public health. But water works executives observe that the control of customers' plumbing is rarely, if ever, vested in their hands. They, therefore, feel that objection can logically be made to an interstate water quality standard which can be used as the basis of non-

certification of an otherwise satisfactory public water supply, because the plumbing on customers' premises does not conform to codes that they do not administer and for which the city executives do not hold them responsible.

C. The willingness of water works men to discuss municipal water quality characteristics with the Service and their co-operation with public health measures in general has led them, and perhaps the Service likewise, to overlook the authority under which the Service promulgates and administers the Drinking Water Standards and the legal limits beyond which that authority does not go.

The Conference of April 17, 1944, served to bring these various viewpoints into sharp relief.

The meeting adjourned with mutual expressions of appreciation for the opportunity to understand the view of the other groups. *Further action awaits the decision of the Surgeon General.*

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## Abstracts of Water Works Literature

**Key:** In the reference to the publication in which the abstracted article appears, **34:** 412 (Mar. '42) indicates volume 34, page 412, issue dated March 1942. If the publication is pagged by the issue, **34:** 3: 56 (Mar. '42) indicates volume 34, number 3, page 56, issue dated March 1942. Initials following an abstract indicate reproduction, by permission, from periodicals, as follows: *B.H.*—*Bulletin of Hygiene (British)*; *C.A.*—*Chemical Abstracts*; *P.H.E.A.*—*Public Health Engineering Abstracts*; *W.P.R.*—*Water Pollution Research (British)*; *I.M.*—*Institute of Metals (British)*.

### INDUSTRIAL WATER SUPPLY

**Natural Waters Available for Industrial Use.** W. D. COLLINS. *Chem. & Eng. News* **21:** 1062 (July 10, '43). Natural waters roughly classified as soft, hard and salt. Soft waters contain less than 30 ppm. of dissolved minerals; supplies are from mountain streams, rivers and lakes of New England. Before advent of ion exchange method, presence of soft water detg. factor in locating indus. plants requiring such supply. Soft water tends to be corrosive. High color common in Atlantic coastal plain swamps. Hard waters most widely distributed in U.S. Intermediate div. represented by Great Lakes, except Lake Superior. In most waters, hardness caused largely by calcium and magnesium bicarbonates. Calcium : magnesium ratio varies from 100 ppm. : 2 or 3 ppm., as in Florida, to equal atomic ratio found in dolomite. Generally, calcium and magnesium together exceed bicarbonate equiv. Sulfuric acid, from mine or indus. wastes, may convert bicarbonate to sulfate, an effect shown on Ohio R. Chloride may sometimes be major constituent in hard water. In naturally softened water total mineral content may be typically in range of truly hard waters, but hardness absent. These sodium bicarbonate waters widely scattered but more common in Atlantic and Gulf coastal plains. Salt water, typified by sea water, 35,000 ppm. dissolved solids, not generally usable. Midland, Mich., brines contg. up to 300,000 ppm. dissolved minerals basis of major chem. industry. In arid and semi-arid regions, rivers may carry as much sodium sulfate as chloride. Well waters generally const. in composition except where

contamd. or when overpumped beyond capac. to transmit recharge water. Large lakes show fairly const. composition. Some large reservoirs stratify and show significant differences at various levels. River waters vary with discharge; common range is from 50% below avg. to 50-100% above avg. concn. Surface waters rarely carry much iron in soln. unless decidedly acid. Suspended matter has reached 12% in Colorado R. at Grand Canyon, Ariz. Well waters often found with pH below 6, occasionally below 5; sodium bicarbonate waters have pH of 8 or more. Ground water temp. close to mean annual air temp. for 30-60' depths; temp. increases 1°F./10' depth from 60-100', according to location. In deeper lakes top 20-30' layer responds to atmospheric changes; greater depths show const. temp. except during overturn when temp. becomes practically uniform. River water temp. likely to approach mean monthly air temp. at given locality, unless special conditions prevail. Surface and ground water at same locality likely to differ radically. Table shows representation of 5 characteristic anals. among 670 typical localities.—A. A. Hirsch.

**Fundamental Considerations in the Treatment of Industrial Waste Waters.** H. ROHDE. *Städtereinigung. (Ger.)* **33:** 167 ('41). In considering problem of disposal of trade waste waters, first general requirements are knowledge of processes from which waste waters derived and full co-operation with mfr. Before considering methods of disposal, possibilities of recovering substances from waste

water and of re-using water should be investigated. In many industries, important to keep waste waters from certain processes separate from other wastes in order that substances worth recovering may be present in sufficient concn. to make their recovery economic. Economics of recovery not, however, always decisive factor; instances where factory must incur some expense in order that waste waters discharged may be harmless. New problems arise with alterations in processes. For example, use of synthetic washing agents in place of soap for wool washing has caused difficulty in separating grease from waste waters with sulfuric acid; this difficulty can be overcome by adding suspension of clay before adding acid or by thoroughly scouring wool before washing. In many cases re-use of waste water combined with recovery of materials but instances where no question of recovery but water may be re-used. This applies to cooling and washing water in gas works and to other water which is not seriously polluted during use, and sometimes after treatment, can be returned to the process. Amt. and cost of treatment required by waste waters before discharge will vary widely with local conditions, e.g., size, condition and future use of stream available. Arrangements made by Ruhrverband and Emschergerossenschaft to prevent discharge of waste waters into unsuitable streams described. In some cases special channels of separate sewers constructed to carry waste waters to suitable stream or to sewage works capable of treating them. Agricultural utilization must also be considered before it is decided that waste waters must be treated. Treatment at sewage works always, where possible, preferable to separate treatment at factory. Effect of waste on material of sewers and plant and methods for equalizing flow must be considered. When separate treatments necessary, each case must be considered as individual problem. In planning new factories considerations of water supply and disposal of waste waters of great importance.—*W.P.R.*

**Industrial Water for Pulp, Paper and Paperboard Manufacture.** TAPPI. Monograph Series No. 1 ('42). Monograph covers general properties, methods of treatment and uses of water of importance to pulp and paper industry. Most of chapters have lists of refs.: Introduction. RONALD G. MACDONALD. Characteristics of Water. VINCENT F. WATERS. Water Required for Pulp and Paper

Making. RODERICK O'DONOGHUE. Filtration of Water. EDWARD S. HOPKINS. Flocculation. LEWIS B. MILLER. Disinfection of Water—Chlorination and Chloramination. Sodium Pentachlorophenate. R. B. MARTIN & JOHN D. FLEMING. Removal of Tastes and Odors from Water. J. G. PATRICK. Corrosion and Its Control. EVERETT P. PARTRIDGE. Softening of Water. ESKEL NORDELL. Boiler Feed Water Preparation. C. E. IMHOFF. Analyses of Waters. VINCENT F. WATERS.—*C.A.*

**Wayside Method of Boiler Water Treatment With Description of Chemical Feeding Equipment, etc.** K. J. WEIR ET AL. Am. Ry. Engr. Assn. 45: 441: 53 (Nov. '43). Treatment of water for locomotive use by direct application of soda ash to locomotive tenders largely replaced by application of chems. to roadside tanks in amt. necessary to neutralize non-carbonate hardness which permits more uniform results. Bypass chem. ball feeders on discharge lines or chem. soln. feeders used. Chem. pumps of centrifugal, diaphragm, rotary, piston or Moyno type. Control equip. includes cycloidal water motor and veloc. propeller type meters. Photos of various types of equip. given.—*R. C. Bardwell.*

**Maintaining Railway Water Service Facilities.** C. R. KNOWLES. R. Eng. & Maint. 40: 4: 348 (Apr. '44). Annual water consumption on American railroads estd. at 750,000 mil.gal. with maint. and operation cost of \$54,000,000. Organization for handling varies on different systems with total of 15,000 employees involved. Tanks in service estd. at 25,000, pumps at 32,000, cast-iron pipe 18,000 mi. and other pipe 10,000 mi. Work of dist. water service repairman considered of utmost importance.—*R. C. Bardwell.*

**Mechanics of Foaming and Carry Over in Locomotive Boilers.** W. B. LEAF, et al. Am. Ry. Engr. Assn. 45: 441: 58 (Nov. '43). Various combinations of inorg. salts cause marked variations in foam heights as detd. with exptl. equip. in D. & R.G.W. RR. lab. at Denver, Colo. Data on foam height for 150 gpg. of varying proportions of 3 component system, NaOH, Na<sub>2</sub>CO<sub>3</sub> and Na<sub>2</sub>SO<sub>4</sub> show variation from 0 to 16". Effect of suspended matter questioned. Rough heating surface increases foam formation. High-speed movies show that in liquids which form no

foam, steam bubbles do not leave heating surface until fairly large. Exptl. work to be continued.—*R. C. Bardwell.*

**What Tannins Do in the Treatment of Locomotive Boiler Water.** C. R. KNOWLES. *Ry. Age* 115: 25: 971 (Dec. 18, '43). Treatment of water for locomotive use now recognized as vital necessity. Bigger development has been in "wayside treatment" when chems. merely added to neutralize incrusting non-carbonate hardness. Tannin compounds of which chestnut extract most widely used, found beneficial in preventing injector and branch pipe incrustation. Consumption of tannins in railway water treatment in '42 estd. at 22,100,000 lb. Prevention of scale assumed to be due to colloidal action on solids pptd. by heat. Reduction in corrosion due to oxygen also claimed. Some tannins give good results in prevention of intercrystalline corrosion or boiler cracking. Claimed that no adequate substitute available for chestnut tannin.—*R. C. Bardwell.*

**Meeting the Demands for Increased Water Supplies in Fast Freight Service.** J. P. HANLEY, *et al.* *Ry. Eng. & Maint.* 38: 820 ('42). As freight and passenger train schedules speeded up, one feature contributing to maintg. schedules was reduced time consumed in taking water and fuel and servicing engine en route. Use of larger capac. engine tanks up to 25,000 gal. capac. or auxiliary tanks increased importance of terminal water stations and reduced no. of intermediate roadside tanks. Water delivery from 4500 to 5000 gpm. considered satisfactory for terminal water column operation; about 3000 gpm. satisfactory for sway spouts direct from storage tanks. Larger pipe delivery lines needed at many points and moving storage tanks nearer to point of delivery proved helpful. Considerable difficulty being experienced in obtaining necessary materials to effect desired improvements, but all possible being done to assist in elimg. delays in movement of nation's traffic under present conditions.—*R. C. Bardwell.*

**Increases Capacity of Large Water Treating Plant With Minimum Use of Critical Materials.** ANON. *Ry. Eng. & Maint.* 38: 616 ('42). Pittsburgh and Lake Erie R.R. recently increased capac. of its lime-soda softening plant at McKees Rock, Pa. terminal from 60,000 to 120,000 gal. per hr. by re-

modeling old Kennicott softener built in '03. Double-deck Spaulding pptr. installed in original 32'7" diam. by 43' high treating tank and softened water stored in two adjacent steel tanks of 570,000-gal. capac. Water obtained from 4 wells with capac. each from 500 to 1000 gpm. Chems. used through dry feeders are lime, soda ash, sodium aluminate and tannin. Operation automatic with only one shift operator. Constr. typical Spaulding pptr. design with exception that double-deck arrangement affords 2 separate sludge blankets, and 2 clear water collectors joined to overflow to storage tanks. Similar changes made in plant of much lower capac. near Pittsburgh passenger station. Diagrammatic dwg. and photos given.—*R. C. Bardwell.*

**Save Critical Materials by Softening Water.** C. R. KNOWLES. *Ry. Age* 114: 17: 820 ('43). Large amt. of critical materials saved through systematic improvement of locomotive water supplies. Saving in fuel estd. at 8 million tons annually. Boiler defects caused by water reduced from 64 to 87%. Wayside plants using partial treatment installed at low cost with good results. Proper blowdown control important. Estd. that 9 lb. of firebox and tube steel saved each yr. for each lb. required for initial installation of water treatment plants.—*R. C. Bardwell.*

**Water for Grain Alcohol Distilleries.** C. S. BORUFF, BERNARD SMITH, & M. G. WALKER. *Ind. Eng. Chem.* 35: 1211 (Nov. '43). Processing water should be free of sediment, tasteless, odorless, clean bacteriologically, and furnish desirable calcium and magnesium bicarbonates with moderate sulfate and trace cations for optimum fermentation with yeast. Today water from any source can be treated to satisfy requirements of mashing and malting, making "natural" characteristically advantageous water unessential. About 700 gal. of process water required per bushel of grain for conversion to 95% alcohol and recovery of feed byproducts. Cooling water for mash coolers, fermenters and stills must be available at the rate of about 250 gal. per bushel of grain. Chlorination elims. biol. forms in heat exchangers. Bicarbonate hardness stabilized cheaply with sulfuric acid for low temp. applications, but otherwise metaphosphate used and concurrently protects against corrosion. Iron phosphate incrustations have collected in double pipe mash coolers. Boiler water conditioned by hot



lime-soda ash treatment with anhydrous disodium phosphate added internally in boilers. Well water, 50–60' deep, warmer (62°F.) in winter than in summer (56°F.) due to temp. lag. Flow diag. for river and well water, and breakdown of water consumption at Hiram Walker & Sons plant, at Peoria, Ill., given.—*A. A. Hirsch.*

**Specifications for Welded Steel Tanks for Railway Water Service.** A. W. JOHNSON, *et al.* Bul. Am. Ry. Eng. Assn. **434**: 155 (Nov. '42). Within past 9 yr. welded steel tank of both standpipe and elevated type has come into use. One of best types of water storage tank available for railway service. Specifications list details for constr. found most practical and satisfactory in railway use.—*R. C. Bardwell.*

**Farm Water Supply Pointers.** *How to modernize farm homes and buildings with pure water on tap.* ANON. Am. Builder & Bldg. Age **65**: 8: 49 (Aug. '43). Running water is modern farm tool; more than any other farm production machine, speeds crops to maturity and increases yield of milk, eggs, meat and vegetables so necessary to fighting forces. Electrically-operated water system will save 30 10-hr. days or more per yr. TVA Manual, "Pumps and Plumbing for the Farmstead" shows avg. water consumption for each: member of family (allowing for kitchen, bathroom, laundry and some sprinkling), 35 gpd.; cow, 30 gpd.; horse (winter 4–8; summer 8–18), 15 gpd.; hog, 2 gpd.; sheep, 1.5 gpd.; 100 chickens, 2.5 gpd.; sprinkler,  $\frac{1}{4}$ " hose, 200 gpd. and  $\frac{1}{2}$ " hose, 275–300 gph. (10 gal. will sprinkle 100 sq.ft.; 20 gal. will soak 100 sq.ft.). Many farm wells and springs inadequate to supply these rates without supplementing source. In planning farm water supply improvements, contact local well driller, health dept. or other qualified agency. Sometimes old well made available or old spring cleaned to increase

flow. Installing shallow well or jet pump in dry, well ventilated basement with gravity drain to ground surface satisfactory. Long suction line from well to basement sometimes limiting factor but offset to extent pump usually 3–4' lower than ground level, if on floor, giving that advantage to suction lift. Deep-well pump unsatisfactory in basement because distance from floor to ceiling insufficient for removing drop-pipe. Often basement extension built to form small pump room. Separate pump houses popular and favored by health authorities; costs little more than well built pump pit and has advantages of ventilation, drainage and access to pump. To protect pipes against freezing, common practice to wrap with  $1\frac{1}{2}$ " felt or equiv. covering. Suction on delivery line passing through exposed space between ground and bldg. constitutes problem. One expedient to insulate with assembly of tile, air spaces, pipe-covering, concrete seal at lower end to exclude water and wood boxing with sawdust at upper end to exclude cold air. Sometimes desirable to run hot water line underground between 2 bldgs. to prevent freezing. Done by supporting line on wood blocks in 4" tile on slant for draining. There should be fire hydrants properly placed about bldgs. for fire protection.—*Ralph E. Noble.*

**Electric Water Systems for the Farm.** M. M. JOHNS. Agric. Extension Service, Univ. of Tenn. Publication No. 260 (Apr. '42). Compact, well-illustrated presentation of farm elec. water systems. Topics: advantages of water under pressure and of elec. pumps over those powered otherwise; planning system for wells, springs or cistern source; water qual. and consumption rates; pump types for specific condition and use; cost factors; storage tanks; pump installations to fit local conditions; pipe sizes for various requirements; motors; and pump maint.—*Ralph E. Noble.*

## TREATMENT—GENERAL

**"Deminrolit" Process of Water Treatment.** E. I. AKEROYD. Wtr. & Wtr. Eng. (Br.) **47**: 8 (Jan. '44). In recent years new process developed by which dissolved salts can be removed from water supply. Known as "Zeo-Karb H-ion Deminrolit" process. Underlying principle is that dissolved salts removed

in two states. First, all basic radicals exchanged for H-ions by passing water through pressure cylinder contg. H-ion exchange material. Result is to convert dissolved salts into their corresponding acids. If water contains ammonium salts or free ammonia, removed in first stage. Water then passed

through second cylinder contg. material which has property of adsorbing acids—"Deminrolit" unit. In gen., effluent from process contains total dissolved solids of order of about 20 ppm. Demineralization process removes 95% of original dissolved solids. Cost approx. 6d. per 1000 gal. (Imp.). Final water has extremely low alkalinity, no free  $\text{CO}_2$  and is satd. with oxygen. Operation of plant almost exactly same as usual base-exchange softening plant, only difference being two units to be regenerated instead of one. Besides complete removal of dissolved salts, modification can be made which will enable removal of only bicarbonates. Modified process known as "Zeo-Karb H-ion Blending." Modification gives advantages of lime-soda process in that total dissolved solids of final product lower by amt. of bicarbonate alky. which has been removed.—*H. E. Babbitt.*

#### An Engineer's Notes on Water Purification.

S. G. BARRETT. Surveyor (Br.) 102: 151 (Apr. 9, '43). 1875 death rate from typhoid fever of 270 per million, reduced in '24 to 12 per million. No official stds. of purity in Britain. All water works exercise careful control of watershed. Strenuous efforts now being made to re-establish agric. after war with recommendation that watersheds be used for adnrl. purposes, e.g., hill sheep farming, afforestation and recreation. Natural purif. and watershed control insufficient to satisfy present demands for purity. Methods are filtration and sterilization. Duration of slow sand filter runs between cleanings avg. between 6 wk. to 3 mo. Water used in cleaning about 0.25% of water filtered. Operating cost of 10-mgd. (Imp.) filter amts. to about 13s 6d per mil.gal. (Imp.). Obvious method to increase output pre-sedimentation of raw water. Pre-coagulation rarely successful owing to clogging of filters. Important development is double filtration in which water passes through primary filter operating at 40-50 times higher rate than normal filter speed. Rapid filtration—not to be confused with double filtration—involves coagulants. To obtain min. requirement of floc, amt. of coagulant needed may alter pH to point below or above optimum value with consequent reduction of floc formation and inefficiency of filtration. Dual coagulation involves scientific blending of acid alum with alk. aluminate, adjusting pH value to ppt. max. aluminum hydroxide as tough, usable and satisfactory floc. Application of coagulants to water in

pressure filtration does not produce visible floc. Rapid gravity filtration is 2-stage process. First, bulky impurities thrown down by floc in pptn. basins. Second, remaining impurities removed by passing through open sand beds. Wash water about 10 times as much as for slow sand filters. Color may pass unreduced through normal slow sand filter. Usual to apply, to colored water, colloid whose particles are charged with static elec. of opposite polarity to color particles. Sulfate of alumina fulfills these requirements and leads to removal of color. Filtration capable of producing effluent of std. purity. Ministry of Health, however, deemed it necessary to sterilize. Sterilizing agents generally employed in Britain in ascending order of popularity: ozone, chloramine and chlorine. Advantages of taste prevention obvious. Ammonia-chlorine elims. taste troubles to great extent. Roughly stated, for bact. sterility, chlorine requires up to 15 min. contact and chloramine 1 and 2 hr. Super-chlorination followed by de-chlorination seems satisfactory solution to elim. complaints of chlorinous taste and to give sufficient contact period. Usual de-chlorinating agents are sulfur dioxide, sodium thiosulfate and, sometimes, activated carbon. Super-chlorination with de-chlorination seems to be successful in dealing with most natural water in country. Break-point chlorination being thoroughly investigated in U.S.—*H. E. Babbitt.*

#### Sewage Disposal Problems at Toronto.

NORMAN J. HOWARD. Eng. Cont. Rec. 56: 51: 10 (Dec. 22, '43). Coliform bacteria densities in excess of 100,000 per ml. frequently recorded in raw Lake Ontario water supply and  $\text{Cl}^-$  content has increased from about 7 ppm. in '12 to 16 in '43. Contract approved for activated sludge plant. Complete treatment, producing effluent which can be economically chlorinated during summer, only remedy for poln. of water supply and bathing beaches. Biol. treatment advisable from standpoint of phenol destruction. At present time, super-chlorination of city water supply for prevention of taste costs \$20,000 annually. Chlorination of present sewage plant effluent, as temporary measure, considered inadvisable as dosage of 13-15 ppm. required would involve annual expenditure of at least \$150,000 and results would be uncertain. Lab. expts. have shown bact. multiplication occurs in chlorinated sewage samples stored at 42-44°F. Similarly, multiplication

might occur in lake. During first yr. of operation of new Victoria Park Water Purif. Plant, which derives supply from Lake Ontario at point some miles east of Island Plant and intakes, saving of \$20,000 in chem. costs effected by drawing water through intake at which raw water of best qual., as disclosed by lab. tests, available.—R. E. Thompson.

**Electrical Water Purification.** *Results of Tests at State Univ. of Iowa.* ANON. The Electrician (Br.) 130: 419 (Apr. 23, '43). Electro-osmosis, elec. water purif. method developed in Germany and little heard of since war. Principle is purif. by removal of salts from central section of cell through diaphragms to cells contg. anode and cathode poles. By passing water from central compartment of a series, water in compartment becomes gradually purer until anions and cations practically all removed. Water thus purified allegedly equiv. to distd. and costs less. App. consists of cells side by side. Purified water siphoned through each central compartment. Anode and cathode water removed by wash water fed from dripping nozzles and escapes from overflow pipes in anode and cathode cells respectively. Cells 9 and 10 washed with purified water. App. eff. detd. by: (1) amt. of current used, (2) amt. and qual. of purified water and (3) amt. of wash water flow. Water qual. judged by detg. elec. resistance, alky., chloride, residue and ash. 176,000 ohms value given for lab. distd. water used. App. supplied by 110-v. generator with max. capac. current of 30 amp. current passed through cells so connected that potential increases as water gets purer. When cells 1, 2, 3, 4 in series; 5, 6, 7 in series; 8, 9 in series; and last cell across bus bar; called 4, 3, 2, 1 connection system. Avg. voltage across first 4, 37.5; across next 3, 37; next 2, 55; and last, 110. As resistance increases from cell to cell, voltage across first much lower than across fourth. In test, process started by filling cells in each chamber uniformly. Wash water regulated to run 24 liters per hr., i.e., 12 for anodes, 12 for cathodes. When current began to fall, feed water added at 24 liters per hr. Above make-up and wash water rates represented std. conditions and variations in flow compared with same. Tests summarized: *Wash water variation:* Varied from 12 to 200 liters per hr. From 12 to 49 liters per hr., no difference noted; with 200 liters, resistance lowered. *Effect of Changing Feed Water Rates:* Zeolite-

softened water used at 15, 20 and 50 liters per hr. At latter rate, increased amp. required; alky. and residue increased; other characteristics decreased, indicating need for limiting feed water flow rate. *Varying Method of Connecting Cells to Bus Bars:* Best water given by 3, 2, 2, 1, 1, 1 system, but required more current. Poorest system 5, 3, 2, required less amp. but water contained chloride, was alk., had low resistance, high residue and ash. Concluded that smaller no. of connected cells better and that many-celled combination (5, 3, 2) least satisfactory. *Cathode Wash Water as Feed Water:* Wash water flow rate set at 50 liters per hr. to provide sufficient cathode water for feed water. Former collected in drum and ppt. settled while 50 gal. (189 liters) more collected in another drum. In center chamber of first cells, ppt. formed and drifted to remaining cells. Ppt. consisted of Ca, Mg, Fe and Al combined with OH and CO<sub>3</sub>. Water qual. deteriorated with operation time. After 16 hr., amp. increased to 14, residue to 17, ash to 12.9 and methyl orange alk. to 4.6, with resistance decreased to 8070 ohms. At end of 23- and 31-hr. tests, water qual. much lower. Cathode water qual., in terms of alky., much lower than original, increasing from 652 to 1720 ppm. Under conditions of expt., cathode water not recommended. *CO<sub>2</sub> Added to Cathode Water to Improve It:* Results unsatisfactory. At first, resistance increased but after 60 hr. dropped to 2300 ohms with alky. increased to 1650 units. Pure water obtained during part of test. *Cathode Water Used as Feed Water and Zeolite-Softened Water for Washing:* No better results obtained. Required no. of amps. increased immediately, chloride present in purified water after 2 hr., and methyl orange alky. 197. Methyl orange alky. of cathode water increased from 1510 to 2500 ppm. *Effect on Dissolved and Other Substances in Soln.:* D.O. in purified water practically same as in feed water. From 15 to 20 ppm. Cl dissolved in anode water when feed and wash water rates each 24 liters per hr. and 4, 3, 2, 1 system used. Purified water pH 4.5 to 5.0 while ash 90 to 95% SiO<sub>2</sub>. When current started with cells contg. raw water, current consumption exceptionally high in same. With dissolved salts concn. relatively high, foam formed in these cells. When partly purified water reached latter, current decreased and foaming ceased in hr. after app. started. When zeolite water used, fine deposit formed on diaphragms. Monthly clear-

ing, however, would obviate. Suspended matter in influent may clog nozzles. Should inspect latter, therefore, twice daily. Supply tanks for washing last 2 cells must be kept full of pure water. With water used, necessary to clean cells every 2 wk. In expts. described, zeolite-softened water and tap water produced water of same qual. characteristics of tap water obtained from 2 wells described in terms of expts. Some operating cost data submitted. Concluded that water with less than 15 ppm. residue obtainable from town supply contg. 725 ppm. total residue. As residue chemically inert, water will serve for most common uses of distd. water. Cannot mix cathode water with tap water for feed water without first treating tap water with lime-soda or lime-barium. Tests substantiated all mfr.'s claims except one. Time and energy lost in starting app. for water of desired qual. not produced until hr. thereafter. Cathode water suitable for indus. use in any process, using lime water. Anode water suitable for bleaching and disinfecting wash water. Less than  $\frac{1}{2}$  elec. energy required to reduce residue from 600 to 300 ppm. than from 300 to 0.—*Ralph E. Noble.*

**Water Treatment at the Calco Chemical Division.** V. L. KING, C. H. BEAN, R. E. LESTER & WILLEM RUDOLFS. *Chem. & Eng. News* **21**: 1046 (July 10, '43). 20 mgd. of water from Raritan R. passes through 0.375" mesh traveling screen. Bulk used directly for cooling; only 3 mgd. treated at a central plant. Raw water characteristics nominally: hardness 60 ppm., mostly bicarbonate; alk. 60 ppm.; pH 7.0 to 7.5. Alk. trade waste raises hardness during extreme low flow of river to 140 ppm. and pH to 9.5. On hot dry days, pH in river may rise from 7.5 in morning to 8.5 in afternoon. Coagulation normally with 34 ppm. alum and 3.4 ppm. sodium aluminate, at pH adjusted to 7.2 opti-

mum with sulfuric acid or caustic soda. Sodium aluminate omitted when river water very alk., but may be doubled, along with alum, when river becomes muddy. Flocculation afforded by passage through 700' pipe to 3- and 3 $\frac{1}{2}$ -mil.gal. ponds, used alternately for fill and draw. Sodium hypochlorite, sufficient to give 1.25 ppm. available chlorine dose during daylight, checks algae in ponds without producing significant residual. Std. sand pressure filters backwashed daily. Adherent mud and dead algae boiled out annually with 0.4% caustic soda soln. steamed for 8 hr. Greensand upflow softeners, on sodium cycle, reduce hardness to 8.5 ppm. for plant use. Copper, iron and chlorine objectionable in production of rubber chems., aniline and  $\beta$ -naphthol; calcium, magnesium, iron and aluminum dull dyestuffs by forming lake. Bitumen lining in hot-water distr. piping has occasionally melted off and clogged small sizes. Boiler water treated with trisodium phosphate to maint. 30-50 ppm.  $\text{PO}_4$ , and with sodium sulfite to show 30-50 ppm.  $\text{Na}_2\text{SO}_3$  in blowdown. Sulfate: soda ratio exceeds 3 : 1 for 480- and 490-psi. boilers, for which total solids held to 2500 and 1500 ppm., resp. No silica deposits have formed although river water and zeolite effluent contains 10 ppm. silica. Refrigeration brines adjusted to pH 7.5 and 8.0 contain 0.2 sodium dichromate per 100 ml. to inhibit oxygen corrosion. Cooling ponds treated variously according to their service; chems. used include: sodium dichromate, 150 ppm. to prevent oxygen corrosion; and chlorine, 3 ppm. supplied by sodium hypochlorite followed by aqua ammonia to destroy tough algae. By-product sulfite brine combined almost immediately with dissolved oxygen, at temp. as low as 40°C., possibly due to org. material acting as catalyst. Large doses of sodium fluoride successful algicide where chlorine residuals undesirable.—*A. A. Hirsch.*

## National Selective Service and Reemployment Policies

THE policies and principles governing administration of the reemployment provisions of the Selective Training and Service Act of 1940 were outlined on May 20, 1944, by National Headquarters of Selective Service in the form of a memorandum (No. 190-A), issued for the guidance of local boards and the reemployment committeemen attached to the boards.

The OWI release \* of May 26, 1944, on the subject, states that the memorandum analyzes each section of the act as it applies to reemployment of veterans, outlining principles to be followed in determining the "permanent" or "temporary" nature of employment. The memorandum deals with problems affecting qualifications of veterans for reinstatement and the duties and obligations of employers, and answers questions regarding seniority rights.

In brief the memorandum states:

Seniority rights accumulate during the veteran's period of active service in the armed forces in the same manner as they would have accumulated had he remained continuously at work in his civilian occupation.

A veteran, in order to claim reinstatement in a position, must be qualified to perform the duties and functions of that position. If unable to qualify for an upgraded job, he is, nevertheless, entitled to a position equal in seniority, status and pay to the one which he left.

A veteran is entitled to reinstatement in his former position or one of like seniority, status and pay, even though such reinstatement necessitates the discharge of a nonveteran with greater seniority.

A veteran is entitled to his former position or one of like seniority, status

and pay, and may refuse another, even though the pay is greater and offers other advantages.

Conscientious objectors have no reemployment rights under the law and the Selective Service System has no responsibility to aid them in regaining former positions or obtaining new positions.

Eligible for benefits under the act are persons who entered the Army, Navy, Marine Corps or Coast Guard (male or female) subsequent to May 1, 1940, but the veterans seeking benefits must have a "certificate" indicating satisfactory completion of service in the armed forces.

Members of the Coast Guard auxiliary are not eligible, nor do the reemployment provisions apply to employees of States, although the act declares it to be the sense of Congress that such persons should be restored to their former positions or to positions of like seniority, status and pay. The policy of the Selective Service System is to render all possible aid to such persons. Many States have passed laws granting their employees substantially the same reemployment rights as are granted to Federal employees by the act.

The act requires the veteran to make application for reemployment "within 40 days after he is relieved from" training and service. This is mandatory and compliance is essential if the veteran is to enforce his reemployment rights over the objection of the employer.

In the case of jobs created by war expansion, the "permanent" or "temporary" character of the job likewise depends upon the facts and circumstances in each individual case.

The memorandum further points out that:

\* S-36.



A veteran entitled to reemployment rights has recourse in the courts to recover back pay, even after reinstatement if it was improperly delayed or postponed by the employer.

A veteran entitled to reemployment may not be discharged from his restored position "without cause within one year after such restoration." The question of what constitutes "cause" is to be determined by "standards of common sense" and is to be measured by "practices and customs generally acceptable in industry or practices and customs in common and accepted use in the particular place of employment."

A veteran who has been reinstated to his former position cannot within

one year be displaced by another, on the ground that the latter has greater seniority rights.

A soldier who is placed in an inactive status and transferred to the Enlisted Reserve Corps, at his own request, on the condition that he will engage in essential industry, loses his reemployment rights if he does not apply to his former employer for reinstatement within 40 days after his transfer.

The functions of the Veterans Personnel Division of Selective Service are confined to assistance to veterans in obtaining reemployment in their former positions.

The memorandum follows:

#### LOCAL BOARD MEMORANDUM NO. 190-A

May, 20, 1944

#### REEMPLOYMENT POLICIES

*Purpose.*—The provisions of section 8, Selective Training and Service Act of 1940, as amended, regarding reemployment rights of veterans, are necessarily broad and general. Questions have arisen and will arise in future as to the application of such general provisions to particular cases. When differences of opinion arise as to the legal interpretation of the meaning and significance of these provisions, it is, in the last analysis, a matter for determination by the courts. In administering the law and carrying out the responsibility of the Director of Selective Service, however, certain policies have been adopted by National Headquarters and it is the purpose of this memorandum to set out such policies for the guidance of all members of the Selective Service System who are charged with carrying out its Veterans Assistance Program.

*Definition of certain terms.*—Whenever used in this memorandum, unless otherwise indicated, the term "*Act*" means the Selective Training and Service Act of 1940, as amended; the term "*service*" means active military or naval service in the land or naval forces of the United States by either males or females; and the term "*reemployment*

*rights*" means the reemployment rights conferred by section 8 of the Act.

*Provisions of the Act.*—The pertinent provisions of section 8 of the Act are set out in Appendix "A" of this memorandum.

#### Part I—Constitutionality of the Act

1. *Constitutionality upheld by Court.*—In the case of *Hall v. Union Light, Heat and Power Company*, decided February 21, 1944, the United States District Court for the Eastern District of Kentucky sustained the constitutionality of section 8 of the Act.

#### Part II—Application of the Act

1. *Persons to whom the Act applies.*—The Act provides that the benefits of section 8 accrue, subject to certain conditions, to "any person inducted into the land or naval forces under this Act." Section 7 of the Service Extension Act of 1941 provides that the benefits of section 8, Selective Training and Service Act of 1940, shall be applicable to "any person who, subsequent to May 1, 1940 . . . shall have entered upon active military or naval service in the land or naval forces of the United States. . . ." Therefore, any person either male or female who enters on

active duty in the land or naval forces of the United States subsequent to May 1, 1940, is entitled to the benefits of section 8 of the Act if he or she meets the other conditions specified. This includes persons serving in the Army, Navy, Marine Corps and Coast Guard.

*2. Persons to whom the Act does not apply.—*

(a) The benefits of section 8 of the Act do not apply to members of the Coast Guard Auxiliary.

(b) The Act does not confer reemployment rights on conscientious objectors who have been assigned to work of national importance under civilian direction in lieu of military service, and it has been determined as our policy that the Selective Service System has no responsibility to aid such conscientious objectors in regaining their former positions or in obtaining new positions.

(c) *The benefits of section 8 of the Act do not apply to persons in the employ of any State or political subdivision thereof, although the Act declares it to be the sense of Congress that such persons should be restored to their former positions or to positions of like seniority, status and pay. It is the policy of the Selective Service System to render all possible aid to such persons, and many States have passed laws granting their employees substantially the same reemployment rights as are granted to Federal employees by the Act. (The italics are ours.)*

### Part III—Requirements for Reemployment

*1. Evidence of satisfactory completion of service.—*The Act requires that a veteran, in order to be eligible for reemployment rights, must have completed his period of service to the satisfaction of those in authority over him. Since this is a prerequisite to reemployment rights, the employer is entitled to proof of completion of satisfactory service. Accordingly, the veteran must have a "certificate" indicating satisfactory completion of his service, but the form of such certificate is immaterial. It may be in any of the following forms:

(1) Certificate of Service (W.D., A.G.O. Form 280) given by the Army to persons transferred to the Enlisted Reserve Corps.

(2) The Report of Separation (W.D., A.G.O. Form 53), if such form indi-

cates on line 27 thereof that the veteran received an honorable discharge.

(3) Any of the certificates of discharge from the Army, Navy, Marine Corps or Coast Guard which, according to the "Table of Discharge Forms," entitles a veteran to reemployment rights if otherwise qualified.

(Note: This table in brief entitles veterans to rights of reemployment Benefits of the Act if honorably discharged from any branch of the service, or if having Certificate of Discharge Under Honorable Conditions from Navy or Coast Guard. Form numbers are: No. 55, Army; No. 660,661, Navy; No. 257,257a and 258a Marines; No. 2510 and 2510A, Coast Guard.)

*2. Time for application.*

(a) The Act requires the veteran to make application for reemployment "within 40 days after he is relieved from" training and service. This is mandatory and compliance is essential if the veteran is to claim his reemployment rights against the objection of the employer.

(b) While the employer cannot, strictly speaking, extend the 40 day period, he can voluntarily reemploy the veteran thereafter and he may as a part of the employment contract agree that the veteran shall be entitled to the benefits of section 8 of the Act. Such an agreement to be enforceable would have to be clear and explicit; otherwise, while the veteran may be employed it is doubtful that he would be entitled to the additional benefits conferred by the Act for seniority, pay and employment for one year.

*3. Ability to perform duties.*

(a) A veteran who duly applies for reemployment must be "qualified to perform the duties of such position" and this is a question of fact to be determined by common sense and experience. The employer cannot set up arbitrary or unreasonable standards. The real question is "Can the veteran do his job in the manner in which he did it before he left?" So long as there is any doubt the veteran is entitled to a chance to prove that he can do so.

(b) A veteran seeking reinstatement in his former position is not required to meet higher standards than existed in the position at the time it was vacated by him, nor is he required to meet standards which the employer may set for others with no reemployment rights. If the position has been so

ungraded that it is beyond the veteran's skill, he is entitled to a job requiring comparable skill and equal in seniority status and pay to that which he vacated.

#### 4. Position "other than temporary."

(a) The Act provides that a veteran otherwise qualified is entitled to reinstatement in his former position only if this was "other than a temporary position." The final determination as to the "temporary" or "permanent" character of a position rests with the Courts. *Every case must be determined on the facts and circumstances in that particular case.* The following administrative policies are merely intended as guides, and are not to be considered as determinative in any given or hypothetical case.

(b) Generally speaking, one who is employed to fill the place made vacant by a person entering service occupies a temporary status and has no reemployment rights even though he subsequently enters service. There may be exceptions to this, however. For example, suppose that A, a permanent employee, enters service and B, also a permanent employee, is upgraded or transferred into A's place and then enters service; if they return, they are entitled to reinstatement in their original permanent positions. It is the character of relationship between the employer and employee, whether "temporary" or "permanent," that should govern rather than the particular assignment being carried out at the time of entry into service.

(c) In the case of jobs created by war expansion, the "permanent" or "temporary" character of the job *depends upon the facts and circumstances in each individual case.* Some of the factors which may be considered are:

- (1) Was the position newly created.
- (2) Was the veteran the first occupant thereof.
- (3) Was it intended as a "wartime" or as a "permanent" position.
- (4) What were the circumstances or agreements at the time of the original employment.
- (5) After employment commenced, was the relationship between the employer and employee such that they contemplated a permanent relationship in the ordinary sense of industrial and commercial practice.

These factors are not conclusive or all-

embracing. Innumerable unknowns may present themselves in each individual case.

(d) While an employment for a fixed and definite period is ordinarily a "temporary" employment, the repeated extension of the contract of employment may indicate that such contract is intended primarily to fix the terms of employment, such as wages, vacations, seniority, bonus, insurance and similar questions, and that the time limitation is secondary. Under such conditions, if the practice of time contracts is general in similar positions within an establishment, such employment may be considered "other than temporary."

(e) Under Regulations of the Civil Service Commission, if a war service appointee (a temporary appointee) of the Federal Government is honorably discharged from active military or naval service prior to the termination of the war, he will be entitled to substantially the same reemployment benefits as are provided for permanent employees under the Act, but that person shall not be required to be retained in employment beyond the limitation placed upon his original appointment. This is usually for the duration of the war and six months thereafter. If any difficulty is experienced in securing the reinstatement of a veteran in a federal position, such case should be referred to the State Director for transmittal to National Headquarters.

(f) Under the Civil Service Regulations, if the bureau, agency, or department in which a Federal Government employee was working at the time he entered the service has been reduced for budgetary or other reasons, a returning veteran if he was only a war service employee is nevertheless entitled to his former position, or a position of like seniority, status and pay even though it requires the dismissal or transfer of a nonveteran war service appointee. If the bureau, agency, or department has been entirely liquidated he is entitled to a position in some other bureau, agency or department.

5. *Change in private employer's circumstances.*—Under section 8 (b) (B) of the Act, a private employer is not required to reinstate a veteran if his circumstances have so changed as to make it "unreasonable or impossible to do so." What constitutes such a change in an employer's circumstances as to make a veteran's reinstatement "impossible or unreasonable" must be decided by the facts and circumstances in each case. The

convenience of an employer must be distinguished from "impossible" or "unreasonable," and the fact that the nonveteran to be replaced is receiving less pay than the employer would be required to pay the veteran should not be considered as a condition "unreasonable" or "impossible." Neither the fact that an employer now employs women in place of male veterans, nor his promise of permanent employment to those who filled the places vacated by veterans, is an excuse for failure to reemploy veterans.

#### Part IV—Circumstances of Reemployment

1. Position of like seniority, status and pay.—(a) Seniority rights accumulate during the period of active military or naval service. Time is credited in the same manner as it would have accumulated had the person remained continuously at work in his civilian occupation.

(b) Where a position has been upgraded, a returning veteran, in order to claim reinstatement in such position, must be qualified to perform the duties and functions of that new position. If unable to qualify for the upgraded job, he is, nevertheless, entitled to a position equal in seniority, status and pay to the one which he left.

(c) A returning veteran is entitled to reinstatement in his former position or one of the like seniority, status and pay even though such reinstatement necessitates the discharge of a nonveteran with a greater seniority.

(d) A veteran is entitled to his former position or one of like seniority, status and pay, and may refuse another even though the pay is greater and offers other advantages.

(e) If, upon a veteran's return from military service, he finds that his employer has entered into employment agreements with others setting up conditions of employment different from those which existed at the time the veteran left, the veteran cannot be deprived of his reemployment rights by reason of these agreements.

(f) In the administration of the Act, the Selective Service System takes the position that the seniority of a person in the service accumulates during such service to the same extent and in the same manner as if such person had remained in continuous employment.

2. Place of reemployment.—The normal place of reemployment of a veteran is the

location at which he was employed when he entered service if the employer is still established there. A change of location is a matter for mutual agreement between employer and employee. A veteran entitled to reinstatement in a former position may not require his employer to employ him in a different location from that of his former position, nor may an employer require such a veteran to accept employment in a different location if the employer is still established at the place of former employment.

#### 3. Immediate reemployment.—

(a) A veteran is entitled to immediate reinstatement. The term "immediate," however, is not to be understood in a literal sense of "instant" but rather as meaning "without unnecessary delay." If a physical examination of the veteran is required, either by law or police or health regulations, or if other preliminaries are necessary as a prerequisite to ordinary employment, a reasonable time should be allowed therefor. Mere convenience of the employer is not an excuse for delaying reinstatement of the veteran.

(b) A veteran entitled to reemployment rights may, by legal action instituted in accordance with the Act, recover back pay even after his reinstatement if such reinstatement was improperly delayed or postponed by the employer.

4. Employment for one year.—(a) A veteran entitled to reemployment may not be discharged from his restored position "without cause within one year after such restoration." What is "cause" for dismissal in any case must be determined by the facts and circumstances in each case. The question is to be determined by standards of common sense and is to be measured by practices and customs generally acceptable in industry or practices and customs in common and accepted use in the particular place of employment.

(b) A veteran who has been reinstated to his former position cannot within one year be displaced by another, on the ground that the latter has greater seniority rights. To permit such displacement would be to nullify the original reinstatement and thus deprive the veteran of his reemployment rights under the Act, and would be, in effect, a repeal of an Act of Congress.

#### Part V—Waiver of Reemployment Rights

1. Requirements for a valid waiver.—When

it is claimed that a veteran has waived his reemployment rights the waiver must be proved by clear and positive evidence. Such waivers, if induced by fraud, misrepresentations, or by any coercive methods, threats or force, are invalid. The burden of proof is upon the employer to prove a voluntary waiver by the veteran.

2. *Transfer to Enlisted Reserve Corps to engage in essential industry.*—It is the view of the Selective Service System that a soldier who is transferred to the Enlisted Reserve Corps, at his own request, on the condition that he will engage in essential industry, loses his reemployment rights if he does not apply to his former employer for reinstatement within 40 days after his transfer.

3. *Disclosure of confidential medical information.*—(a) The Report of Separation (W.D., A.G.O. Form No. 53), or any other definitive information as to the reasons for separation from the armed forces provided to the Selective Service System, even though it may come into the hands of the local board and be placed in the registrant's Cover Sheet, has been determined to be confidential and not a part of the registrant's file and such information may not be disclosed or furnished to or examined by any person, including the registrant, other than those in the Selective Service System who have reason for the use of such information. Such information and the form by which it is furnished to the Selective Service System is the property of the War and Navy Departments, respectively, and any registrant or other person desiring such information will be referred to the branch of the service from which the veteran has been separated.

(b) An employer has no right to establish as a condition precedent to a veteran's reinstatement in his former position that he signed a waiver of his rights to keep his medical history and diagnosis confidential or to insist as a condition precedent to reinstatement that the veteran authorize the employer to secure such information from the War or Navy Department.

## Part VI—Reemployment Functions of Selective Service

1. *Veterans Personnel Division.*—The Act imposes on the Director of Selective Service the responsibility for establishing a Personnel Division to assist qualified veterans in obtaining reemployment in their former positions or employment in new positions. The functions of the Veterans Personnel Division are presently confined to assistance to veterans in obtaining reemployment in their former positions and the responsibility for assistance in obtaining new positions is being exercised by the Director of Selective Service through the United States Employment Service of War Manpower Commission.

2. *Assistance of State Director or Director.*—

(a) Whenever a Local Board or its Reemployment Committeeman is in doubt as to a veteran's rights the case should be submitted to the State Director for his advice and assistance. The State Director may, in his discretion, submit any case or question to National Headquarters.

(b) In every case, due regard should be given to the fact that a veteran must apply for reinstatement within 40 days after he is released from duty. For this reason, members of the Selective Service System should act as promptly as possible in such matters.

3. *Procedure when court action required.*—The rights of a qualified veteran to enlist the services of the United States Attorney and to proceed in the United States District Court against an employer who refuses to restore him to his former position are set out in paragraph (e) of section (8) of the Act. It is important that in no case should a State Director, Local Board or Reemployment Committeeman send a case to the United States District Attorney for prosecution under the Act. Where the need for legal proceedings is indicated, the file should be sent to National Headquarters for review and for forwarding to the Department of Justice for proper action.

LEWIS B. HERSHEY,  
Director

## APPENDIX "A"

### REEMPLOYMENT PROVISIONS—SELECTIVE TRAINING AND SERVICE ACT OF 1940, AS AMENDED

Sec. 8. Certificates and physical examinations: Reemployment; . . . Replacement in industry.

(a) Any person inducted into the land or naval forces under this Act for training and service, who, in the judgment of those in



authority over him, satisfactorily completes his period of training and service under section 3 (b) shall be entitled to a certificate to that effect upon the completion of such period of training and service, which shall include a record of any special proficiency or merit attained. In addition, each such person who is inducted into the land or naval forces under this Act for training and service shall be given a physical examination at the beginning of such training and service; and upon the completion of his period of training and service under section 3 (b), each such person shall be given another physical examination and, upon the written request of the person concerned, shall be given a statement of medical record by the War Department; *Provided*, That such statement shall not contain any reference to mental or other conditions which in the judgment of the Secretary of War or the Secretary of the Navy would prove injurious to the physical or mental health of the person to whom it pertains.

(b) In the case of any such person who, in order to perform such training and service, has left or leaves a position, other than a temporary position in the employ of any employer and who (1) receives such certificate, (2) is still qualified to perform the duties of such position, and (3) makes application for reemployment within forty days after he is relieved from such training and service—

(A) if such position was in the employ of the United States Government, its territories or possessions, or the District of Columbia, such person shall be restored to such position or to a position of like seniority, status, and pay;

(B) if such position was in the employ of a private employer, such employer shall restore such person to such position or to a position of like seniority, status, and pay unless the employer's circumstances have so changed as to make it impossible or unreasonable to do so;

(C) if such position was in the employ of any State or political subdivision thereof, it is hereby declared to be the sense of the Congress that such person should be restored to such position or to a position of like seniority, status, and pay.

(c) Any person who is restored to a position in accordance with the provisions of paragraph (A) or (B) of subsection (b)

shall be considered as having been on furlough or leave of absence during his period of training and service in the land or naval forces, shall be so restored without loss of seniority, shall be entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employees on furlough or leave of absence in effect with the employer at the time such person was inducted into such forces, and shall not be discharged from such position without cause within one year after such restoration.

(e) In case any private employer fails or refuses to comply with the provisions of subsection (b) or subsection (c), the district court of the United States for the district in which such private employer maintains a place of business shall have power, upon the filing of a motion, petition, or other appropriate pleading by the person entitled to the benefits of such provisions, to require specifically such employer to comply with such provisions, and, as an incident thereto, to compensate such person for any loss of wages or benefits suffered by reason of such employer's unlawful action. The court shall order a speedy hearing in any such case and shall advance it on the calendar. Upon application to the United States district attorney or comparable official for the district in which such private employer maintains a place of business, by any person claiming to be entitled to the benefits of such provisions, such United States district attorney or official, if reasonably satisfied that the person so applying is entitled to such benefits, shall appear and act as attorney for such person in the amicable adjustment of the claim or in the filing of any motion, petition, or other appropriate pleading and the prosecution thereof to require specifically such employer to comply with such provisions: *Provided*, That no fees or court costs shall be taxed against the person so applying for such benefits.

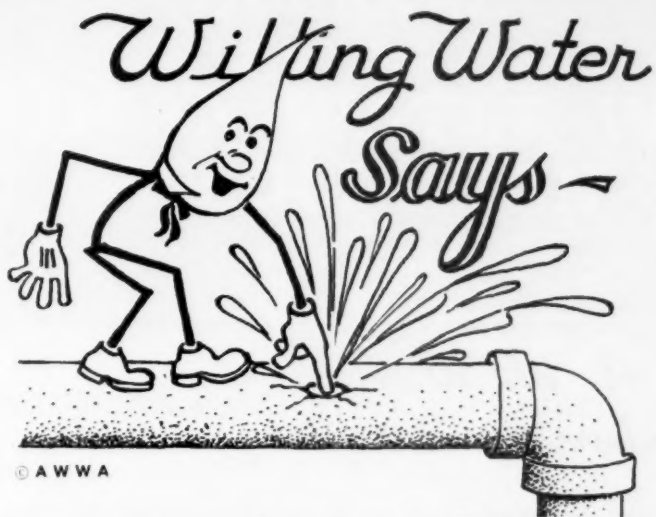
(g) The Director of Selective Service herein provided for shall establish a Personnel Division with adequate facilities to render aid in the replacement in their former positions of, or in securing positions for members of the reserve components of the land and naval forces of the United States who have satisfactorily completed any period of active duty, and persons who have satisfactorily completed any period of their training and service under this Act.

*Note:* Subsections (d) (f) (h) and (i) of Section 8 above have been omitted here as unimportant to reemployment information.

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• A leak from a 1/8" hole wastes 100,000 gallons of water and will raise your water bill \$20.00 for one month !!

**STOP  
WATER WASTE**

*All over the country water works men are adapting ideas from the book "Water Conservation" to get across to their consumers the message of how to use water usefully.*

*Some of these adaptations reach us here at the A.W.W.A. head quarters. For example the drawing from Mr. M. P. Hatcher, Director, Department of Water, Kansas City, Mo., was used on a postcard billing to carry the message of water conservation to customers. The sketch of Willing Water was printed on the address side of the postcard bill—that portion retained by a customer.*

*Thanks very much, Mr. Hatcher, for sending it along to us.*

## *The A. W. W. A. Membership Directory*

will be published as a supplement to the September JOURNAL. Does the Association have your latest address complete with postal zone number, for publication therein?

No military addresses will be printed; therefore, members in the Armed Forces should submit their permanent civilian addresses.

No changes of address for use in the Directory will be accepted after July 21. If your name and address as they appear on the wrapper of this JOURNAL are not correct, write immediately to Association headquarters, 500 Fifth Avenue, New York 18, N. Y.